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EXPERIENCE OF SOVIET MEDICINE IN A GREAT PATRIOTIC WAR 1941-194--ETC(U)
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EXPERIENCE OF SOVIET MEDICINE IN A GREAT PATRIOTIC WAR
1941-1945

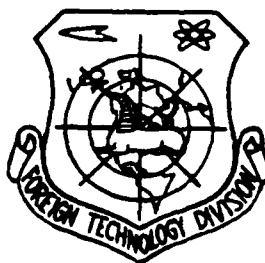
by

Ye. I. Smirnov, Editor

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more frequently than with the breaks upper third, and 2 1/2 times it is more frequently than in lower third of thigh (at the identical frequency of small shortenings with any localization of the bullet break of thigh).

Shortening was measured by the degree of the setting of the cortical layers of broken ends; in this case were not considered the ends of the broken ends, deprived in the X-ray image of cortical layer, and also very damaged ends of the cortical layer. Consequently, was measured the setting of distinctly projecting cortical layer of one of the broken ends in comparison with the appropriate side of the cortical layer of other broken end.

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With the dual break (at the different levels) it was necessary to consider the relationships/ratics between the proximal broken end and the intermediate ones, and also between the intermediate and the extremital.

Disagreement and bone defect were measured also along the axis of bone, but in contrast to the shortening the measurement was produced between the ends of broken ends, independent of the condition of cortical layer.

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EXPERIENCE OF SOVIET MEDICINE IN A GREAT
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By Ye. I. Smirnov, Editor

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Setting (shortening) and disagreement of broken ends were measured in the centimeters.

In connection with the observations of B. K. Babich, which concern shortening with the different types of bullet break, the unit of the roentgenological observations was subjected to the appropriate analysis, moreover were compared two groups of the bullet breaks of the thigh: multifragment breaks and breaks oblique and cross.

Displacement along the length (shortening) was observed with the multifragment bullet breaks into $14.4 \pm 2.80\%$, with the oblique and cross breaks - $44.8 \pm 5.40\%$. Thus, with the oblique and cross bullet breaks of thigh shortening was observed twice more frequently than with the multifragment breaks. With the oblique and cross breaks, furthermore, was observed more frequently the more expressed shortening than with the multifragment breaks. This position/situation retained its force with the localization of the break as in the upper, so in middle and lower third of thigh.

Given data completely confirm B. Zh. Babich's instruction, that the displacement along the length was observed more frequently and it was expressed sharper with the bullet oblique and cross breaks, than

with the multifragment ones. Oblique and cross bullet breaks were usually connected with the damage of muscles for the smaller elongation/extent; muscles, not traumatized and, therefore, which are not found in the parietic condition, conditioned the displacement, similar observed with the closed breaks of the corresponding departments of thigh.

One should, however, add that because of the treatment this difference in the shortening with individual types of the breaks of thigh up to the moment/torque of extraction was smoothed (that 16).

Besides the displacement along the length, they deserve the attention of displacement to the side and at angle.

Displacement to the side, to the front and toward the rear determined frequently in the centimeters, however, since most simply was measure, being oriented toward the thickness of the diameter of diaphysis in the region of break, then in the histories of disease/illness it is possible to meet these, for example, records: "there is a displacement of extremital broken end towards the inside to half-diameter, toward the rear - to one-and-a-half diameter". The displacement of extremital broken end was towards the outside observed rarely, whereas displacement towards the inside - very frequently.

The displacement of extremital broken end towards the inside was encountered with the oblique and cross breaks somewhat more frequent (61.00/o) than with comminuted breaks (47.50/o). It especially frequently was revealed with the breaks upper third (with the multifragment breaks - into 54.70/o, with the oblique ones and the cross ones - into 86.30/o). Greatly frequently there was displacement towards the inside, also, with the breaks middle third (with the multifragment ones - into 46.80/o, with the oblique ones and the cross ones - into 62.90/o; less frequent, but nevertheless fairly often this displacement it was discovered with the breaks of lower third of thigh (with the multifragment ones - into 36.70/o, with the oblique ones and the cross ones - into 40.00/o).

The displacement of the extremital broken end of thigh toward the front presented large rarity. Is virtually important with the bullet breaks of thigh displacement in the opposite direction - toward the rear.

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On author's material with the breaks of upper third of thigh extremital broken end was displaced toward the rear into 16.00/o, whereas with the break in middle and lower third of thigh - into 46.40/o (type of break - multifragment, by sand bar cross - did not have essential effect on the frequency of displacement toward the rear).

Displacement with the presence of the bearing/angle, opened towards the inside, was discovered with the bullet break middle third approximately/exemplarily three times less frequent than with the break in upper third, and three times it is more frequently than with the break in lower third (see below). Displacement with the presence of the bearing/angle, opened toward the front, was established/installed with the bullet breaks middle third approximately four times less frequent than in the lower (in upper third this angular displacement almost never was observed).

With the multifragment breaks of thigh the angular displacement

with the presence of the bearing/angle, opened towards the inside, was discovered with the break of upper third of thigh into 30.60/o, with the break of middle third of thigh - into 13.00/o, with the break of lower third of thigh - into 3.30/o.

With the oblique and cross breaks of thigh the bearing/angle, opened towards the inside, was discovered into 34.10/o with the break of upper third of thigh, into 10.40/o - with the break of middle third of thigh and into 3.30/o - with the break of lower third of thigh.

In such a manner both with the multifragment ones and with the oblique and cross breaks of thigh the angular displacements with the presence of the bearing/angle, opened towards the inside, were observed approximately/exemplarily in each third case with the breaks upper third, in each 8-10th case - with the breaks middle third and exclusively rarely - with the breaks lower third. Inverse relationships/ratios were observed in the presence of the bearing/angle, opened toward the front. Thus, with the bullet multifragment breaks the bearing/angle, opened toward the front, in the dependence on the localization was observed with the following frequency: into 1.90/o - with the breaks of upper third of thigh, into 13.00/o - with the breaks of middle third of thigh and into 53.30/o - with the breaks of lower third of thigh.

With the oblique and cross bullet breaks were discovered the analogous relationships/ratios: 0.0c/o - with the breaks of upper third of thigh, 14.3o/o - with the breaks of middle third of thigh, 46.6o/o - with the breaks of lower third of thigh.

Consequently, the was arranged/located below the bullet break (both multiframe and by sand bar and cross), the more frequently was observed the angular displacement, which was being characterized by the presence of the bearing/angle, opened toward the front, and the less frequently was observed the bearing/angle, opened towards the inside.

The angular displacement with the bullet breaks of thigh with the presence of the bearing/angle, opened toward the rear, was stated/established on author's material on the whole rarely and, as a rule, in the combination with more sharply pronounced, and therefore even by the prevailing displacement at the angle, opened towards the inside (with the breaks of upper third of thigh). Casuistic rarity presented the angular displacements with the presence of the bearing/angle, opened towards the outside.

Thus, as a result of the bullet break of thigh were observed

shortenings mainly with the oblique and cross breaks and are considerably less frequent in the smaller measure those expressed - with the multifragment breaks.

Besides the shortening, was considered the displacement to the sides and at an angle. With the high constancy was encountered the displacement towards the inside, moreover primarily in upper third; whereas in middle lower third, although frequently, it is nevertheless less frequent than in upper third. Oblique and cross breaks gave the large displacement towards the inside, than multifragment ones.

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The displacement of extremital broken end toward the rear meddled in middle and lower third almost three times more frequently than in upper third of thigh.

In effect it was importantly determine the presence of the angular displacement with the bearing/angle, opened towards the inside and to the front. Displacement at the angle, opened towards the inside, was encountered in essence with the breaks of upper third of thigh; displacement at the angle, opened toward the front, mainly, with the breaks lower third.

Entire above-mentioned relates to the basic broken ends of thigh - proximal and extremital, and also to the large/coarse fragments (in particular, in the cases of double break at the different levels). However, fine/small broken ends were displaced most frequently on the route/path of shell; therefore observed in the photographs both fine/small broken ends and metallic dust from the wounding shell they gave presentation/concept about the peculiarity of the route/path, passed by shell in this organ/control.

Special attention turned to the standing of broken ends after surgical intervention, namely after the cross resection (Fig. 150). The carried out of the afterward extensive collinuted, crushed break of that complicated by osteomyelitis, cross resection of thigh even for the sufficiently significant elongation/extant, with the retention/preservation/maintaining of periosteum, could prove to be completely effective (Fig. 151).

At the same time frequently after cross for the significant elongation/extent resection of thigh was observed the sharp shortening of log of bone on 12-20 cm, moreover the general/common/total shortening of extremity sometimes still was increased because of angular displacement.

Deserve also attention the roentgenologically checked outcomes of surgical intervention for the purpose of overcoming the displacement of broken ends. During the analysis of the consequences of the bullet breaks of thigh (during the offensive operations in the beginning of 1945), based on materials of one of FEP, almost in 3/4 of the cases of the bullet break of the thigh of shortening along the length either in no way it was observed or it was so/such insignificant (to 3 cm), which could be easily corrected.

Nevertheless in each fourth case of bullet break shortening proved to be more significant and it required overcoming with the aid of the appropriate measures.

On the basis of roentgenological supervision the outcomes of therapeutic measures in 241 case were such: displacement was overcome completely into 58.50/o, partially - into 10.30/o, therapeutic measures proved to be futile into 31.20/o.

These results, obtained in the hospitals of front, it was possible to consider completely satisfactory especially because over the long term in the following stages of evacuation was expected the even further improvement.

First, first-aid medical and first medical aid and transport immobilization with the bullet breaks of thigh.

Docent Major of medical service L. Ye. Ruzhman.

From the survey/coverage of the military medical reports, works of army and front line medical conferences, and also reports and resolutions, published in the works of scientific medical advice/councils it is apparent that to correct and timely rendering to first, first medical and first medical aid with the bullet breaks of thigh in the Great Patriotic War was pressed the fundamental importance.

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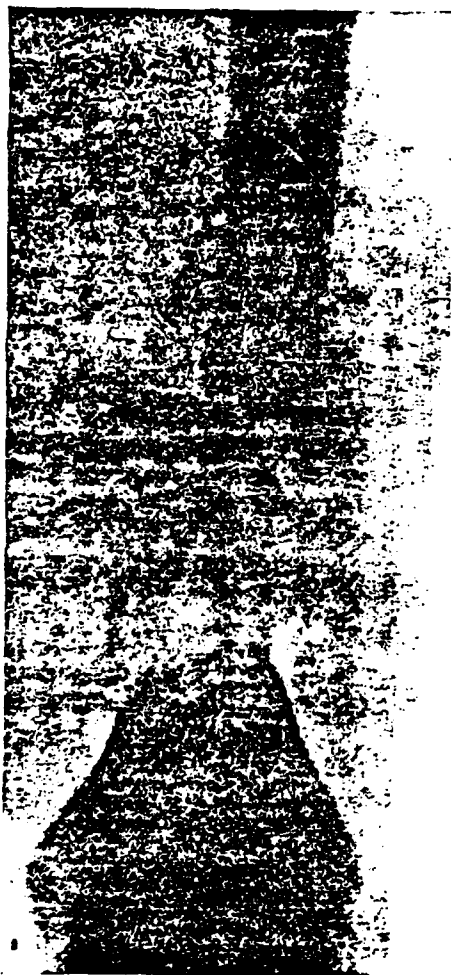


Fig. 150. In repeated photograph 2 months after resection of thigh of manifestations no osteomyelitis there is (clinically - wound healed). Weakly expressed pericosteal corn.

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Fig. 151. Repeated photograph after already 2 months. Callus of thigh

by entire elongation/extent, extremital broken end, however, is somewhat displaced toward the rear and at angle.

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This was determined by the universally recognized Pirogov position/situation of military field surgery, that the first aid is to a considerable degree of that deciding for further course and outcome of wound.

First aid with the bullet breaks of thigh proved to be in the Great Patriotic War, beginning from the field of combat, in accordance with the basic principles of the contemporary stage treatment, which consists in the struggle with the shock, with blood loss and with infection and in the urgent evacuation of casualties according to the designation/purpose to the following stage.

Based on materials of the deepened development of the histories of disease/illness, the first aid with the bullet breaks of thigh was shown/rendered within the following periods (Table 161).

From Table 161 it is evident that the overwhelming majority of casualties with the bullet break of thigh (about $\frac{2}{3}$) obtained first aid for the first hour after wound; about $\frac{1}{3}$ the casualties obtained

it later than 6 hours.

For the periods of rendering of first aid the presence or the absence of the associated wounds did not have vital importance; however, was planned certain tendency toward its distance with the associated wounds. Thus, with them for the first hour after wound first aid was shown/rendered into 61.00/o, i.e., up to 5.20/o less than first aid, shown/rendered by casualty without the associated wounds.

The periods of rendering of first aid on the years of war are given in the appropriate chapter of this volume (pg. 141). Within the time of war the rendering of first aid for the first hour was increased from 53.3 to 72.30/o.

According to the data of military-medical reports, in last year of war the first aid with the bullet breaks of thigh was shown/rendered in the first 6 hours after wound into 95.00/o of cases.

According to the data of M. S. Lur'yev, which envelops the significant group of casualties with the bullet break of thigh, who obtained wound period from February of 1944 through April 1945, the first aid into 58.70/o was shown/rendered into the first 30 minutes

after wound.

Thus, the periods of rendering of first aid with the bullet breaks of thigh in recent years of war were earlier, that one should relate due to an improvement in the quality of the work of the medical and sanitary service of army area. Earlier rendering aid by casualty during this period favored also the offensive character/nature of combat operations with the rapid penetration of the defense of enemy.

Are represented below those borrowed from the materials of the deepened development of the histories of the disease/illness of information regarding that, and where rendered aid.

Table 161. Periods of rendering of first aid with the bullet breaks of thigh (in the percentages).

(2) Группа раненых с переломом	(1) Сроки	(3) 1 час	2-5 (4) часов	(5) 6 часов и позже	(6) Всего
(7) Без сопутствующих ранений . .		66.2	14.5	19.3	100.0
(8) С сопутствующими ранениями . .		61.0	16.4	22.6	100.0
(9) В среднем		64.5	15.2	20.3	100.0

Key: (1). Period. (2). Group of casualties with break. (3). hour. (4). hours. (5). hours and later. (6). In all. (7). Without accompanying wounds. (8). With associated wounds. (9). On the average.

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On the field of battle the first aid was shown/rendered by way of auto- and mutual assistance into 28.80/o, by aidman and by medical instructor - into 55.90/o, by feldsher at BMP - in 3.80/o, by doctor at PMP - in 11.50/o. Consequently, first aid was shown/rendered on the field of battle of substances the order/formation of auto- and mutual assistance are somewhat more than 1/4 casualties with the bullet break of thigh. This is explained by the severity of wound and by the relative complexity of the application of dressing on the wound with the break of thigh. All this in a number of cases deprived

the soldier of the possibility to use very for the dressing a first aid kit or to resort to comrade's aid to that moment/torque, as it will show/render aidman.

Therefore in contrast to other groups of casualties greater half of casualties with the break of thigh (55.90/o) aid rendered aidman and medical instructor of the medical separation/section of company. Thus, 84.70/o of casualties with the bullet break of thigh first aid proved to be in the company sector. Of the very insignificant unit of the casualties (3.80/o) first aid with the first-aid medical was simultaneously shown/rendered by the feldsher of BMP, and within 11.50/o periods of first aid they coincided with the first medical, i.e., aid was shown/rendered at BMP as a result of obtaining of wound in immediate proximity of BMP and even DMP, where they exerted all means of first aid immediately after wound.

Based on materials of the different authors, this information was somewhat different (Table 162).

Author's data, which relate to a total quantity of casualties with the bullet break of thigh, that were being observed by it personally at DMP during the combat operations/processes in different periods of war, by no means coincide with those given above. The periods of rendering of first aid, just as the degree of the

participation in it of the medical composition of individual foremost stages, were always located in direct dependence on the character/nature of the organization of the medical and sanitary service of subunit, from the special features/peculiarities of combat, area relief, combat losses of medical separations/sections mouth, etc., i.e., from the concrete combat situation.

Table 162. Rendering of first aid with the bullet breaks of thigh on the different authors (in the percentages).

(1) Автор	(2) Период войны	(3) Само- и молитва	(4) Антист- руктор и санитар (пота)	(5) Индекс нр (БМП)	(6) Проч (ИМП)	(7) Всего
(8) А. В. Гудлев	(9) Второй год войны	35,5	51,5	—	13,0	100,0
(10) И. Н. Ерофеев	(11) С 22/VII по 15/X 1941 г.	52,9		47,1		100,0
(12) И. Н. Ерофеев	(13) С декабря 1941 г. по октябрь 1942 г.	29,0				100,0
(14) М. С. Лурье	(15) Последний год войны .	57,0	17,8	10,9	14,3	100,0
(16) Данные медицинских отчетов	(17) " " "	25,5	61,8	6,8	5,9	100,0
(18) Л. Е Рухман	(19) За всю войну	17,0	71,0	6,7	5,3	100,0
(20) Углубленная разра- ботка	" " "	28,8	55,9	3,8	11,5	100,0

Key: (1). Author. (2). Period of war. (3). Auto- and mutual assistance. (4). Sanitary instructor and sanitation man (company). (5). Feldsher. (6). Doctor. (7). In all. (8). A. V. Gulyayev. (9). Second year of war. (10). I. I. Yerofeev. (11). 22/VII on 15/X 1941. (12). From December 1941 through October 1942. (13). M. S. Lur'ye. (14). Last year of war. (15). Data of medical reports. (16). L. Ye. Rukhman. (17). For entire war. (18). Deepened development.

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The volume of the medical aid by casualty in the Great Patriotic War on the whole to the system of the stage treatment of casualties for each stage individually was completely specific; however, to the known degree was established the dependence also on the

character/nature of combat operations and special features/peculiarities of tactical military and medical and sanitary circumstances.

The work of the operating in the company sector medical separation/section on rendering aid by casualty with the bullet break of thigh consisted in the occlusion of the wound of thigh by the bandage of first aid kit, in the temporary/time stop of hemorrhage, the simplest immobilization and the carrying out/removal of casualty from the field of combat into the near cover.

Based on materials of the author's development of the histories of disease/illness, with the rendering of first aid in the company sector aseptic bandage was superimposed into 87.30/o, and bandage with the antiseptic - into 12.70/o. As the antiseptic used 100/o liquid of iodine for the lubrication the skins in the periphery of wound. In the company sector by way of first aid into 10.40/o (with respect to a total quantity of casualties with the break of thigh) was superimposed the tourniquet to the thigh for the purpose of the temporary/time stop of hemorrhage.

Rendering to first medical aid with the bullet breaks of thigh at BMP was realized in complete agreement with the volume of work, provided for for this category of casualties in this stage: the

organization of the rapid carrying out/removal of casualties from the company sector, the correction of the superimposed in the company primary bandage, if she insufficiently occluded wound, the inspection/check of need and correctness of the imposition of tourniquet, the imposition of transport immobilization with standard splints, prophylaxis and struggle with the shock by the simplest accessible methods and the shipment of casualties at PMP after preliminary evacuation classification. The volume of medical aid with the bullet breaks of thigh at BMP, in view of its immediate vicinity to the line of fire and equipment status, according to requirements for its mobility, was limited to first aid. Interventions, which compose the content of urgent medical aid, were included only in the volume of the work of BMP of special individual battalions, and also in those special cases when the battalion of regiment, fulfilling independent combat mission, performed separately from regiment and BMP was intensified by medical cadres and equipment. Based on materials of the deepened development of the histories of disease/illness, at BMP primary bandage to the wound was superimposed to a very insignificant quantity of casualties (3.80/o). Tourniquet was taken/removed during the inspection/check at BMP in 1/o, casualties with the break of thigh, that entered with the tourniquet. Tourniquet was for the first time superimposed at BMP in 1.20/o (with respect to general/common/total number of casualties with the break of thigh). The blood transfusion at BMP with the bullet breaks of

thigh as antishock measure composed of altogether only 0.04o/o total quantity of cases of the blood transfusion with the bullet breaks of thigh in all stages.

According to the data of the military medical reports, prophylaxis and struggle with the shock with the bullet breaks of thigh at BMP were conducted in all cases in accordance with the requirements and the possibility and they were expressed mainly (besides transport immobilization) in the heating of the casualty by wadded blankets and by chemical heaters, to the issue of alcohol and injection of morphine and cardiac substances.

The periods of carrying out/removal and delivery/procurement of casualties with the bullet break of thigh at BMP, based on materials of the author's development of the histories of disease/illness, were such: to 1 hour - 20.5o/o, from 2 to 6 hours - 48.3o/o, from 7 hours and later - 31.2o/o. Thus more than $\frac{2}{3}$ casualties they were delivered at BMP in the first 6 hours after wound.

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According to B. M. Iopukhovskiy of in winter wounded from the field of combat they carried by the following methods: on four skis, fastened together, 40.0o/o, on ski-stretcher installations - 20.0o/o,

on the stretchers - 12.0o/o, on the cape-tents - 18.0o/o, on the improvised stretchers - 7.0o/o and on itself - 3.0o/o. In summer in defense 70.0o/o of casualties they were carried out on the stretchers, and remaining 30.0o/o - on the cape-tents. With the offensive on the stretchers it was carried out by 70.0o/o of casualties, on the cape-tents - 25.0o/o and on itself - 5.0o/o.

According to S. I. Banaytis's data, which relate to the period of east Prussian operation/process of 1945, it is carried out from the field of combat: on the stretchers - 47.0o/o, on ski-stretcher installations - 13.0o/o, on drags - 11.0o/o, on the ponchos - 20.0o/o and on the hands - 9.0o/o of casualties.

Based on materials of the personal observation of the author, the carrying out/removal of casualties with the bullet break of thigh was realized by winter on boat-drags in 55.2o/o, on ski-stretcher installations (Fig. 152) - into 28.3o/o, on the stretchers - into 7.6o/o, on the cape-tents - into 7.8o/o and on itself - into 1.1o/o, in summer on the stretchers - into 74.3o/o, on the cape-tents - into 22.6o/o and on itself - into 3.1o/o.

Consequently, as the in summer basic means of carrying out/removal served stretchers, and in winter - ski-stretcher installations and drags as least traumatizing casualties. On the

stretchers, ski-stretcher installations and drags there was outlying more than $\frac{3}{4}$ casualties with the bullet break of thigh.

The first medical aid by casualty with the bullet break of thigh proved to be at PMP. The first medical aid at PMP was the struggle with the shock and the blood loss, of the inspection/check of tourniquet and quality of primary bandage, of the imposition of worthy transport immobilization standard splints, of the preventive introduction of sera, to documentation and classification of casualties and organization of their urgent evacuation on further stage. Into the volume of work of PMP entered also rendering aid by casualty, which according to one or the other reasons did not obtain it in the company sector and at BMP (see above).

The periods of rendering to the first medical aid, thus, were determined, first of all, by the time of the entry of casualties at PMP. Based on materials of the author's development of the histories of disease/illness, medical aid by casualty with the bullet break of thigh, which entered PMP, was shown/rendered within the following periods after the wound: to 1 hour - into 11.50/o from 2 to 6 hours - into 38.80/o, from 7 hours and later - into 49.70/o of cases. Consequently, by casualty with the bullet break of thigh medical aid more than in half of the cases was shown/rendered in the first 6 hours after wound.

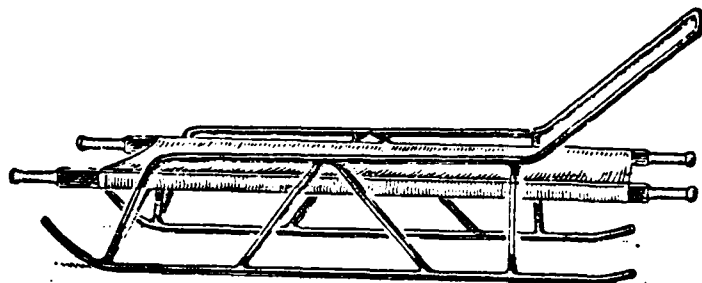


Fig. 152. Ski-stretcher installation.

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However, the periods of the delivery/procurement of casualties to PMP in the individual combat operations/processes of division were different and they depended on the character/nature of combat, area relief, season and days, etc. During the combat operations/processes of division on the penetration of the defense of enemy on the Karelian neck during June 1944 it was delivered to PMP in the first 6 hours after wound by 81.3c/o of casualties with the bullet break of thigh.

According to the data of military-medical reports, in 1944 61.3c/o of casualties with the bullet break the thighs were delivered in the first 8 hours after wound already at DMP. On the basis of these data it is possible to assume that toward the end of the war in

connection with a change in the combat situation and the sharper work of the medical and sanitary service the periods of rendering to the first medical aid with the bullet breaks of thigh considerably were improved.

At PMP with the application of primary aseptic dressing to the wound used the lubrication by 10c/c iodine of skin around the wound, introduction to 2o/o of solution of chloramine to wound (into 52.3o/o of cases) and dusting the wounds by the powder of streptocide (into 1.7o/o of cases).

In the struggle with the shock and the blood loss, based on materials of the deepened development of the histories of disease/illness, at PMP were employed accessible and tested effective means and receptions/procedures: the heating of the casualties with blankets and chemical heaters, the issue of hot sweet tea, food and alcohol, the introduction of morphine and cardiac substances, the transfusion of blood and blood-substituting fluids/liquids, the transport immobilization of break, novocaine blockade and subperiosteal anesthesia of the place of break. At PMP is hotter the drinking, heating and injections of morphine were general/common/total measure for all entered casualties with the break of thigh.

During the first years of war the blood transfusion, according to the materials of the deepened development, at PMP was not widespread (among the different stages of the blood transfusion at PMP it passed only by 1.0c/o); especially rarely was transfused the blood at PMP during the first two years of war.

During the subsequent 2 years of war the transfusion of blood and its substitutes at PMP with the bullet breaks of thigh obtained (depending on combat situation) very wide application. Thus, according to the data of E. M. Lcpukhevskiy, S. M. Sukovatnykh and S. V. Teplyakov, that relates to the combat operations/processes of 1943, the transfusion of blood and its substitutes was produced at PMP in all cases of the bullet breaks of thigh, complicated by shock, and it achieved 17.0-20.0c/o all entered with the break of thigh. According to S. I. Banaytis, the frequency of the use/application of transfusion of blood and its substitutes at PMP of some large units/formations in the east Prussian operation/process of 1945 achieved 41.2c/o, and in the east Prussian operation/process of invasion 1944 - 47.4c/o (to a number of bullet breaks of thigh).

According to the data of the military medical reports, the blood transfusion with the bullet breaks of thigh, complicated by shock, was used in 1944 in the army area to 132.0c/o, and novocaine blockade - into 25.0c/o (to a number of bullet breaks of thigh). The degree of

participation in this measure PMP in the reports is not indicated.

In a number of antishock measures on PMP it is wide and successfully (especially in recent years of war) was used subperiosteal novocaine anesthesia into hematoma and less frequent novocaine blockade. According to E. M. Lopukhovskiy, at PMP was in 48.7% of the cases and a sheath Novocaine block in produced subperiosteal novocaine anesthesia 15.90/o of the casualties, who entered with the break of thigh. According to S. I. Banaytis's data, the frequency of use/application at PMP of the anesthesia of the break of thigh achieved in the east Prussian operation/process of 1945 88.90/o with respect to a number of casualties.

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Based on materials of the author's development of the histories of disease/illness, 9.00/o of all entered PMP casualties with the bullet break of thigh are delivered with the styptic tourniquet, superimposed in the preceding stages. During the inspection/check at PMP the hemorrhage after the removal/taking of tourniquet in 1/5 the unit of the cases was not renewed. Tourniquet was for the first time superimposed at PMP in 0.60/o (to general/common/total number of entered PMP casualties with the break of thigh). Thus, at PMP the hemostatic tourniquet was used into 7.80/o of cases.

Based on materials of personal observation, 8.40/o of all entered from PMP to DMP casualties with the break of thigh are delivered with the tourniquet, moreover in 1/4 casualties hemorrhage after the removal/distance of tourniquet was not renewed. In recent years of war a quantity of tourniquets, superimposed on PMP without the sufficient readings/indications, decreased 2-3 times, which was the result of the systematic training of medical composition in correct use/application of tourniquet.

Into the volume of the first medical aid entered the introduction under the skin of the preventive doses of antitetanic and antigangrenous serum. Reducings, which relate to this question, obtained based on materials of the deepened development of the histories of disease/illness, are represented in table 163.

From table 163 it is evident that antitetanus serum with the bullet breaks the thighs began to introduce with BMP, moreover almost to half of casualties (43.40/c) it was introduced at PMP. Antigangrenous serum was introduced, beginning with BMP (0.20/o), but also at PMP it was introduced in a comparatively insignificant number of cases (6.90/o).

On the importance of transport immobilization in the general/common/total system of the first-aid and medical measures, conducted with the rendering to first aid casualty with the bullet break of thigh, and about her immense effect on the course and the outcomes of this heavy damage he was sufficiently known even to the Great Patriotic War according to the experiment/experience of the last wars.

In the beginning of the first world war the majority wounded britannia armies greatly rapidly was evacuated into England. Lethality in this case was very great and achieved with the breaks of thigh 90.00/o. To a large quantity of these casualties was produced amputation.

Table 163. Distribution of casualties with the bullet break of thigh in the stages of the introduction of preventive sera (in percent).

(1) Этап эвакуации (2) Вид сыворотки				(3) Лечебное учреждение			Прочие этапы	Многоразово на разных этапах	Итого	Сыворотка не вводилась	(11) Всего
	БМП	ПМП	ДМП	(4) Армейское	(5) Фронтное	(6) Тыловое					
(12) Противостолбнячная	0.6	43.4	27.0	14.3	3.3	0.8	2.4	8.2	100.0	13.5	100.0
(13) Противогангренозная	0.2	6.9	38.2	32.2	6.7	3.6	3.1	9.1	100.0	75.1	100.0

Key: (1). Stage of evacuation. (2). Form/species of serum. (3). Therapeutic installation. (4). army. (5). front line. (6). rear. (7). (8) Repeatedly at various stages
Other stages. (9). Altogether. (10). Serum was not introduced. (11). In all. (12). Antitetanus. (13). Antigangrenous.

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After introduction to the supply of the splint of Thomas and its systematic use/application as the transport immobilization the percentage of lethality with the bullet breaks of thigh was lowered.

In the report about the combat ones of activity X in Finland (1939-1940) P. A. Cyprian wrote: "it is here appropriate to note the value of immobilization with the shock, observed with the breaks of

thigh. Impressive to the best change in the condition of such casualties after application of the splints of Diedrichs and Thomas - Vinogradov leaves full/total/compleat satisfaction and it forces, first of all, to the immobilization of extremity".

In the Great Patriotic War, in all authors' unanimous opinion, transport immobilization with the bullet breaks of thigh must was to compose (and actually/really it comprised) the principal unit of first, first and medical aid. It was the best combat means with the shock, hemorrhage and infection.

The dependence of the outcomes of wound with the bullet breaks of thigh on the transport immobilization in the Great Patriotic War is sufficiently illustrated in the military medical reports about the Orel operation/process of 1941, the Voronezh operation/process of 1942, an Orel-Kursk operation/process of 1943, and Mozyr-Gomel operation/process. These data show that with poor splinting the anaerobic infection with the bullet breaks of thigh was observed into four, and lethality is five times more frequent.

In the "instructions in accordance with the military field surgery" attention was paid to the need for the realization of immobilization with the breaks of thigh already in the company sector from the used and standard splints. Immobilization by standard

splints was considered necessary in the medical platoon of battalion. At PMP the immobilization of extremity by transport standard splints had to be faultless in all cases of the identified or suspected break and first of all of the break of thigh.

The shipment of casualties with the bullet break of thigh with PMP to the following stage without the proper immobilization was considered inadmissible. The position/situation indicated entered into the instructions of main army medical administration as one of the basic principles of the stage treatment of the bullet breaks of thigh.

The total characteristic of that how in actuality was realized transport immobilization with the bullet breaks of thigh in the Great Patriotic war, can be given only after will be examined the data, concerning frequencies, periods, stages and the character/nature of the used transport immobilization.

Based on materials of the deepened development of the histories of disease/illness, the transport immobilization of casualties with the break of thigh was superimposed into 81.1c/o. In remaining 18.9c/o of cases to explain, in what stage was produced primary transport immobilization, from the histories of disease/illness did not manage, but this rather is explained by deficiencies in the

documentation, than by the absence of transport immobilization.

The imposition of transport immobilization in the stages of evacuation was distributed, based on materials of the author's development of the histories of disease/illness, as follows: company - 7.60/o, BMP - 59.0/o, PMP - 17.30/o, DMP - 9.40/o, army area - 6.70/o.

Based on materials of personal observation, transport immobilization with the bullet breaks of thigh was laid in the company sector in 17.30/c, at BMP - in 62.50/c, at PMP - in 13.20/o and at DMP - in 7.00/o.

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The primitive immobilization of the break in the company sector in the majority of the cases was realized by fixation by the bandages by that packed on the item the tag of the damaged extremity in the halfbent position/situation in the elbow, to the healthy/sound extremity, also packed on the item tag.

According to the data of S. I. Banayt's, which relate to the combat operations 1944-1945, only 1/2 casualties with the bullet break of thigh was delivered to PMP without the preliminary

superimposed in the preceding stages transport immobilization, but in some large units/formations the delivery/procurement of casualties with the break of thigh at PMP without the transport immobilization was not observed completely. Consequently, the basic stage of the imposition of the transport immobilization was BMP. In the fraction/portion of PMP and the subsequent stages of army and army area fell mainly the work on the correction of transport immobilization - its additional strengthening or full/total/complete replacement with its inadequacy, and also the realization of reimmobilization in the cases of the need for the examination of the break. Transport immobilization was not applied at BMP only ^{to} those casualty with the bullet break of thigh, whose break was not suspected, or in those exceptional cases, when according to the conditions of combat situation to put transport immobilization was impossible. In the following stages of army and army area, beginning with PMP transport immobilization it was laid, as a rule, in all cases of the identified or suspected break of thigh. According to B. M. Lopukhovskiy's data, beginning with PMP, transport immobilization was realized into 98.90% of all diagnosed breaks of thigh. According to military medical reports, during the Kirovograd offensive operation on every 100 casualties, subject to immobilization, the latter was realized in the army area in 100 casualties; of them in the army area are reimmobilized 75, including 34 by gypsum bandage. During the operation/process on assault crossing of Dnepr are

respectively immobilized in the army area of 100 casualties, in the the army are reimmobilized 70, of them 49 by gypsum bandage.

The favorable activity of transport immobilization on the course and the outcomes of the bullet breaks of thigh is explained by advancing/attacking state of rest and by provision of an immobility of the region of wound and break. Rest removes pains and exerts the inestimable services in the struggle with the shock - the basic whip of the bullet breaks of thigh in the army area, unavoidable with the transport with the mobile/motile broken ends. Rest also stimulated the processes of regeneration and safeguarded from the secondary hemorrhage and the development of anaerobic infection. Generally known, according to contemporary concepts of the mechanics of the movement of joints and muscular dynamics, that the rest is achieved by the exclusion of lateral and rotational movements, that can ensure the set of busbars along the lateral and front-posterior sides of extremity. Bandage, beginning from toes of the foot, must go to the edge/rib arc, fix/reccrd entire pelvis and along the healthy/sound side reach at least the large trochanter.

In the Great Patriotic War the best and universally recognized method of transport immobilization with the bullet breaks of thigh in the army area was the method, which justified itself as far back as of events in Khalkhin-Gol (1938), also, during the war with White

Finns (1939-1940) and matching primitive immobilization with the fixed/recorded traction/extension. In practice this found expression in the use/application of those accepted in the Soviet army extension splint of Diedrichs (Fig. 153) and its modifications and extension splint Thomas - Vinogradov.

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All these splints it is not possible to name/call ideal splints for the immobilization of the break of thigh, since they have a number of essential deficiencies; however, under conditions of army area they showed/rendered the inestimable service.

According to the data of the deepened development of the histories of disease/illness, for the primary transport immobilization with the bullet breaks of thigh they were used: the improvisation of splint - into 0.6c/o, the splint of Cramer - in 13.2o/o, the splint of Diedrichs - in 40.0o/o splint of Diedrichs with the gypsum annuli - into 0.5c/o, Vinogradov's splint - into 3.7o/o, other types of splints - into 11.4o/o, splint without the instruction of its character/nature - into 30.6o/o.

According to these data, the most widely used type of transport immobilization was the splint of Diedrichs (40.5c/o).

Thomas-Vinogradov's splint did not receive wide acceptance and it was used in all into 3.7o/o. More frequently was laid wire splint (13.2o/o). Significant place (30.6o/o) occupies "splint". Under this name, it is necessary to assume in a significant number of cases was implied the splint of Diedrichs or its modification. The improvised splints were used in the minute quantity of cases (0.6o/o), probably, as a result of the more frequent utilization on the field of battle of standard splints. According to the data of S. V. Teplyakov, splinting of thigh at PMP was realized by three wire splints or plywood splints in 77.5o/o, by the splint of Diedrichs - in 20.9o/o and by Thomas-Vinogradov's splint into 1.6o/o; the latter was used exclusively with the wound of thigh with the damage to bone in lower third. According to D. A. Kovalev's data, for the immobilization of thigh in the field hospitals served the splints of different types into 94.3o/o and among them predominantly the splint of Diedrichs and Thomas-Vinogradov, gypsum bandages - into 5.7o/o. Based on materials of personal observation, primary transport immobilization in entered DMP casualties with the bullet break of thigh was realized in the preceding stages with the aid of the splint of Diedrichs in 65.3o/o, Thomas's splints - into 8.4o/o and the extended wire splints - in 26.3o/o.

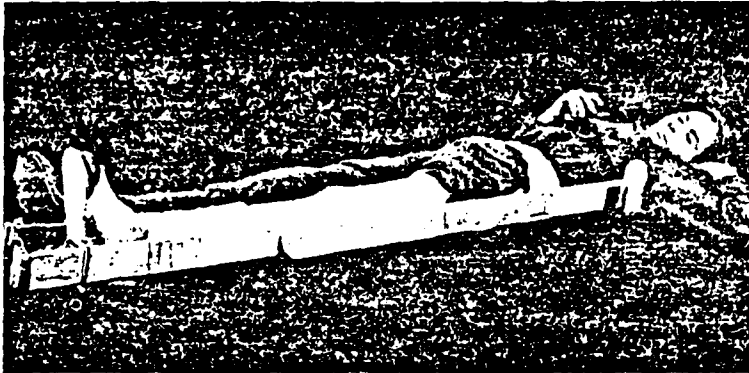


Fig. 153. Extension transport splint of Diedrichs, applied to the thigh.

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According to S. I. Baraytis, in 1944-1945 the methods of the immobilization of the bullet breaks of thigh in some delivered to PMP wounded large units/formations were the following: the improvised splints - 23.00/o, splints plywood and wire - 32.00/o, the splints of Diedrichs - 45.00/o; and in casualties, delivered to DMP and in KhPPG of the first line, the splints of Diedrichs and Tofilo were applied in 89.20/o, wire splints, plywood and those improvised - in 10.80/o. Based on materials of the military medical reports, transport immobilization with the bullet breaks of thigh in the army area was realized in the overwhelming majority of cases (68.00/o) by a splint of Diedrichs in the typical or modified form/species.

The proposed for the transport immobilization of the breaks of thigh in the army and army area at different fronts of the Great Patriotic War temporary/time splints of different constructions/designs (Ye. S. Itkinson, A. A. Safronov, P. I. Tofilo and others) are mainly different modifications of the splint of Diedrichs. Toward the end of the war the refinement of transport immobilization with the breaks of thigh went on the line of the best strengthening of the splint of Diedrichs to the body and the extremity with the aid of the gypsum annuli and Cramer splints (N. N. Yelanskiy, I. M. Popov'yan, I. A. Zvorykin et al.) and the elimination of the sagging of extremity (L. Ye. Rukhman et al.).

From the modified splints of Diedrichs most was used extensively at some fronts portable, is easy and the rapidly laid and ensuring the best rest of extremity three-valved transport splint of Tofilo (Fig. 154).

Thus, rendering to first aid with the bullet breaks of thigh in the Great Patriotic War was conducted in complete agreement with those directed toward the struggle with the shock, the hemorrhage and the infection by the basic principles of the contemporary stage treatment of casualties.

First aid to the overwhelming majority of casualties with the break of thigh was shown/rendered in the field aching in the first hour after wound.

The first medical aid proved to be on PMP, where the significant part of the casualties with the break thighs delivered in the first 6 hours after wound. The volume of medical aid at PMP was determined by the established concrete military and medical-tactical circumstances.

Transport immobilization was the principal unit of the premedical and first medical aid with the bullet breaks of thigh and the powerful combat means with the shock, hemorrhage and infection. Primary transport immobilization was realized to the overwhelming majority of casualties with the break of thigh, and beginning with PMP - in all cases of the identified or suspected break of thigh.

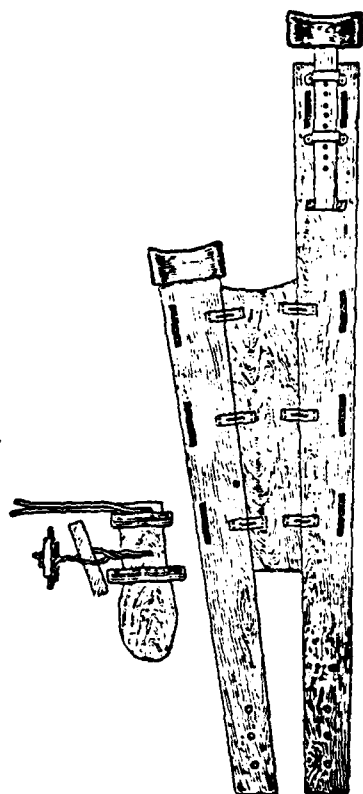


Fig. 154. Extension transport Tcfilo splint.

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By the basic stage where was realized the first transport immobilization with the breaks of thigh, was EMP, and the splint of Diedrichs was the basic form/species of transport immobilization in the army and army area.

Primary surgical processing treatment of the bullet breaks of thigh in an army area.

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The bullet breaks of thigh during the Great Patriotic War composed 13.00/o of all bullet breaks of long tubular bones (shoulder, forearm, thigh and shin). In view of the severity of clinical course, duration of treatment, direct and distant complications with these wounds, the significant percentage of disablement and lethal outcomes these damages carried to the rank of very severe.

According to "instructions in accordance with the military field surgery", the primary surgical processing of the bullet breaks of thigh had to be produced predominantly at DMP. As a result of the overloading of the foremost stages of evacuation for the height of combat operations/processes the unit of the casualties was directed directly into nearest KhPPG of the first line where the volume of the surgical work corresponded such at DMP.

In certain cases the casualties underwent primary surgical processing neither at DMP nor in KhPPG of the first line, but were

evacuated immediately into the army ones, but sometimes also the front line specialized hospitals for radical surgical intervention and imposition of constant therapeutic immobilization.

Based on materials of the deepened development of the histories of disease/illness, primary surgical treatment with the bullet breaks of thigh was conducted in the following stages of evacuation: in 73.80/o - at DMP, in 18.70/o - in KhPPG, in 2.20/o - in the army evacuation hospital, into 1.00/o - in the front line evacuation hospital, in 0.20/o - in GLR, in 0.10/o - in the rear evacuation hospital, into 1.20/o - in other stages and into 2.80/o stage it was unknown.

Table 164. Distribution of casualties with the bullet break of thigh according to the form/species of break and time of primary surgical treatment (in the percentages).

(2) Вид перелома	(3) Первые сутки			(7) Позже 24 часов	(8) Время не уста- новлено	(9) Итого
	(4) 12 часов	(5) от 13 до 24 часов	(6) час не установ- лен			
(10) Дырчатый	39,5	16,0	11,4	27,4	5,7	100,0
(11) Поперечный и продольный	32,2	16,4	9,3	32,2	9,9	100,0
(12) Косой	29,1	17,7	11,3	35,5	6,4	100,0
(13) Раздробленный	33,0	17,1	12,7	30,6	6,6	100,0
(14) Оскольчатый	30,6	17,3	9,8	35,2	7,1	100,0
(15) Краевой	33,5	15,1	11,2	30,3	9,9	100,0
(16) В среднем	31,7	16,9	10,7	33,3	7,4	100,0
	59,3					

Key: (1). Time of primary surgical treatment. (2). Type of break.

(3). First day. (4). hours. (5). from 13 to 24 hours. (6). hour is not established/installed. (7). It is later than 24 hours. (8). Time is not established/installed. (9). Altogether. (10). Perforated. (11). Cross and longitudinal. (12). By sand bar. (13). Crushed. (14). Fragmented. (15). Edge/boundary. (16). On the average.

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Thus, 92.50/o of casualties with the bullet break thighs underwent primary surgical treatment on DMP and in KhPPG of the first line.

The success of the treatment of the bullet breaks, in particular the breaks of thigh, in many respects depended on time, character/nature and quality of primary surgical treatment.

As can be seen from table 164, about all 2/3 casualties with the bullet break of thigh underwent primary surgical treatment during the first day, of them 31.70/c in the first 12 hours, and third of all casualties underwent primary surgical treatment after 24 hours.

Here necessary to note that within the earlier periods they underwent primary surgical treatment both the simplest breaks (perforated -39.50/o and edge/boundary -33.50/o) and most complex (crushed by -33.00/o), since casualties with the uncomplicated break required simpler surgical treatment, and casualties with the crushed

break underwent early surgical treatment from the vital readings/indications.

As far as production is concerned in the primary surgical treatment with the bullet breaks of thigh on the years of war, then during the first year of war for the first 6 hours the primary surgical treatment of the bullet break of thigh was shown/rendered 10.50/o of casualties, and later than 24 hours - 46.80/o; during the fourth year of war in the first 6 hours to primary surgical treatment it underwent by 21.50/o of casualties, and it is later than 24 hours - only 26.00/o. Thus, in the process of war the periods of rendering to the first surgical qualified aid everyone was shortened.

This is especially clearly evident from the comparison of two combat operations/processes in the different periods of the Great Patriotic War (pg. 145) of Germans' rout at Moscow (October of 1941 - February of 1942) and in the environs of Berlin (April - May of 1945).

Table 165. Distribution of casualties with the bullet break of thigh according to the time of the rendering of primary surgical treatment and the clinical outcomes (in the percentages).

(1) Время первичной хирургической обработки	(2) Клинический исход									
	(3) Хороший функциональный и анатомический результат	(4) Деформация в месте разрыва	(5) Контрактура	(6) Анкилоз	(7) Пустой сустав	(8) Остеомиелит	(9) Другие комбинации	(10) Всего		
6 часов (11)	12.2	1.1	1	5.4	0.5	4.6	25.3	50.0		
7-12 часов (12)	15.7	1	1	7.8	0.5	2	31.7	50.0		
13-24 часа (13)	8.3	0.4	1	7.1	0.5	0.2	32.1	50.0		
Первые сутки (час не установлен) (14)	1.2	1.7	4.2	7.3	0.3	0.3	29.8	50.0		
Позже 24 часов (14)	8.6	1.1	0.5	8.7	1.7	0.6	29.4	50.0		
В среднем (15)	10.7	1.0	1.7	7.5	0.7	1.8	29.3	100.0		

Note. Table concerns only casualties with the break without accompanying and combined wounds.

Key: (1). Time of primary surgical treatment. (2). Clinical outcome. (3). Good functional and anatomical result. (4). Deformation on the spot of break. (5). Contracture. (6). Ankylosis. (7). Empty joint. (8). Osteomyelitis. (9). Other combinations. (10). Altogether. (11). hours. (12). hour. (13). First day (hour is not established/installed). (14). It is later than 24 hours. (15). On the average.

In comparison with the rout of the Germans in the environs of Moscow a number of surgical processed casualties during the battle for Berlin in the first 6 hours was increased from 5.4 to 19.3o/o; simultaneously sharply it was lowered the percentage of the casualties, who were subjected to the surgical treatment of later than 24 hours (from 56.7 to 28.0).

The clinical outcomes of the bullet breaks of thigh in the dependence on the time of production in the primary surgical treatment are characterized by the data, represented in table 165, of which the completely obviously positive value of the early periods of primary surgical treatment with the bullet breaks of thigh; other conditions being equal, of more than 12.0o/o good functional and anatomical results was possible to obtain when primary surgical treatment was produced in the first 12 hours. In proportion to lengthening the periods of production in the primary surgical treatment was increased a quantity of ankylosis from 0.4 to 3.5o/o quantity of dummy joints - from 0.5 to 1.0o/o quantity of osteomyelitis - from 4.5 to 6.6o/o.

The character/nature of the primary surgical treatment of casualties with the bullet break of thigh, based on materials of the

deepened development of the histories of disease/illness, was the following:

(1) Первичная хирургическая обработка	Процент (2)
(3) Рассечение мягких тканей раны	48,3
(4) Иссечение мягких тканей раны	12,9
(5) Рассечение и иссечение с перевязкой сосудов	1,7
(6) Рассечение и иссечение с удалением инород- ных тел	7,6
(7) Рассечение и иссечение с удалением костных осколков	17,5
(8) Рассечение и иссечение с обработкой костных отломков	1,1
(9) Ампутация	4,5
(10) Прочие, сочетанные	6,4
<hr/>	
(11) Итого	100,0
(12) Не было обработки	24,5

Key: (1). Primary surgical treatment. (2). Percentage. (3). Splitting up of soft tissues of wound. (4). Carving of soft tissues of wound. (5). Splitting up and carving with dressing of vessels. (6). Splitting up and carving with removal/distance of foreign bodies. (7). Splitting up and carving with removal/distance of bone fragments. (8). Splitting up and carving with treatment of bone broken ends. (9). Amputation. (10). Other, matched. (11). Altogether. (12). It was not treatment.

Consequently, most frequent operation/process during the primary surgical treatment was splitting up of wound.

However, if we follow the character/nature of primary surgical treatment with the bullet breaks of thigh during entire war, then it is represented in the following form (table 166).

Table 166. Character/nature of the primary surgical treatment of the bullet breaks of thigh on the calendar years of war (in the percentages).

(1) Год	(2) Характер первичной хирургической обработки	(3) Рассечение	(4) Иссечение	(5) Рассечение и иссечение с удалением инородных тел	(6) Рассечение и иссечение с обработкой костных фрагментов и удалением костных осколков	(7) Прочие и не указано	(8) Итого
1941		43,9	23,0	7,7	9,2	16,2	100,0
1942		57,3	13,6	6,4	11,9	10,8	100,0
1943		56,6	9,3	7,1	17,0	10,0	100,0
1944		43,2	14,0	7,6	21,6	13,6	100,0
1945		30,6	13,5	10,2	28,7	17,0	100,0

Key: (1). Year. (2). Character/nature of primary surgical treatment. (3). Splitting up. (4). Carving. (5). Splitting up and carving with removal/distance of foreign bodies. (6). Splitting up and carving with treatment of bone fragments and removal/distance of bone fragments. (7). Other and it is not indicated. (8). Altogether.

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Splitting up and carving of the soft tissues which in the first the years of war occupied significant place among the measures, which were being used during the primary surgical treatment, during the subsequent years at the increasing rate/tempo were replaced by the more radical surgery, with which together with the treatment of soft tissues was performed also the treatment of bone breaks and the

removal/distance of free bone fragments, and also foreign bodies from the wound.

Simultaneously with this during the Great Patriotic War was increased the total quantity of casualties with the bullet break of thigh, that were subjected to primary surgical treatment and respectively was decreased a number of casualties, who were not subjected to surgical intervention: so, during the first year of war did not undergo surgical treatment by 44.80/o, in second - 29.00/o, into the third - 19.60/o, into the fourth - 12.00/o.

High value for the establishment of the character/nature of surgical intervention had the form/species of break (table 167).

Thus, with the perforated and edge/boundary breaks when the damage of soft tissues and bone was usually mildly expressed, splitting up of wound to the bone in the majority of the cases created satisfactory conditions for the drain of wound discharge. With the perforated and edge/boundary breaks splitting up it underwent with respect 64.6 and 58.90/o of wounds. The treatment of bone and the removal/distance of bone fragments with these breaks were only 7.4 and 5.40/o. Primary surgical treatment did not undergo the perforated and edge/boundary breaks in the greater percentage of the cases, than all remaining, heavier forms/species of breaks.

With the crushed and comminuted fractures when soft tissues and broken bone were insufficiently viable, to splitting up of soft tissues underwent smaller number (31.4 and 44.80/o) of this category of those wounded. The operational treatment of bone ends and the removal/distance of bone fragments with the simultaneous carving of nonvital soft tissues with these wounds are produced into 23.3 and 26.40/o.

Table 167. Character/nature of primary surgical treatment in the various forms of the bullet break of thigh (in the percentages).

(1) Вид перелома	(2)Характер первич- ной хирургиче- ской обработки	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Рассе- чение	Иссе- чение	Рассе- чение и иссе- чение с пере- вязкой сосу- дов	Иссе- чение с уда- лением ино- род- ных тел	Рассе- чение и иссе- чение с обра- боткой кост- ных фраг- ментов и удалением костных осколков	Ампу- тации	Прочие опера- ции	Итого	Не об- рабо- вано	
(12) Дырчатый	64,6	12,0	2,3	10,9	7,4	—	2,8	100,0	29,4	
(13) Краевой	58,9	14,4	2,2	11,8	5,4	—	7,3	100,0	27,0	
(14) Поперечный и про- дольный	57,9	15,3	—	9,3	10,0	—	6,6	100,0	23,8	
(15) Косой	54,0	14,7	0,6	8,9	16,1	0,4	5,3	100,0	29,2	
(16) Раздробленный	31,4	9,7	3,0	5,9	23,3	20,5	6,2	100,0	16,2	
(17) Оскольчатый	44,8	13,1	1,2	6,8	26,4	0,4	7,3	100,0	19,8	

Key: (1). Form/species of break. (2). Character/nature of primary surgical treatment. (3). Splitting up. (4). Carving. (5). Splitting up and carving with dressing of vessels. (6). Splitting up and carving with removal/distance of foreign bodies. (7). Splitting up and carving with treatment of bone fragments and removal/distance of bone fragments. (8). Amputations. (9). Other operations/processes. (10). Altogether. (11). it is not processed. (12). Perforated. (13). Edge/boundary. (14). Cross and longitudinal. (15). By sand bar. (16). Crushed. (17). Fragmented.

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Turns itself attention the large number of amputations (20.50/o), produced apropos of the crushed breaks. On the average for

entire war the amputations during the treatment of the bullet breaks of thigh composed 4.50/c, of them large part was produced apropos of the crushed breaks, which were being escorted/tracked by the heavy decomposition of soft tissues, large vessels and nerves.

The frequency of the amputations of thigh, produced during the primary surgical treatment, on the years of war was following (in the number treated 1941 - 2,6, 1942 - 3,9, 1943 - 3,4, 1944 - percentages to 5.5 and 1945 - 6.5. This increase in the quantity of amputations is explained by the fact that the wounds became from year to year heavier as a result of an increase in the number of breaks, caused by fragments, and breaks with that associated by wounds.

However, the basic factor, which explains a gradual increase in the number of amputations with each year of the Great Patriotic War, was accumulation in the surgeons of the experiment/experience which determined the real limits of the conservative treatment of the bullet breaks of the thighs, which were being treated initially too optimistically. The cases of the wounds of the thigh and other extremities with the lethal outcome after the late conducted amputation forced surgeons to resort to this more frequent, also, within the earlier periods.

Anesthetization during the surgical treatment of the bullet breaks of thigh was closely related to the character/nature of

damage. Thus, the primary surgical treatment of perforated and edge/boundary breaks, which consists in essence in splitting up of wound, was performed under the local anesthesia into 55.0o/o of cases, with the crushed breaks only into 30.5o/o of cases.

On the whole for the primary surgical treatment of the bullet breaks of thigh local anesthetization was used into 40.5o/o of cases, cerebrospinal - into 0.4o/o, chloroethyl - into 33.7o/o, chloroethyl and ether/ester - into 6.4o/o, ether/ester - into 17.6o/o, hexobarbital - into 0.8o/o and other forms/species of anesthetization - into 0.6o/o of cases.

The selection of the method of primary surgical treatment depended, first of all, on the character/nature of damages, on the general condition of casualty and on the available complications. Thus, the more complex methods of the treatment of bone fragments were used during the more complex damages to the bone also of soft tissues. During the heaviest heavy damages to the bone also of soft tissues and in the presence of the severe complications whereas which sometimes were developed into the first hours after wound, for example, during the anaerobic infection, surgeon, taking into account the severity of the general condition of casualty, who did not allow/assume the use/application of other more conservative methods of treatment, was solved for the amputation.

With the different methods of primary surgical treatment the shock and anaerobic infection were encountered most frequently in casualties, who were subjected to amputation; in them the shock was observed into 32.60/o of cases, and anaerobic infection - into 27.40/o of cases. The same must be noted, also, in the relation to those casualties who were treated of bone fragments; in them the shock was observed into ^{29.3}~~30~~o/o of cases. All this underscores that in casualties with the bullet break of thigh, that were subjected to amputation and treatment of bone fragments, is observed the especially heavy clinical picture. Both the shock and anaerobic infection in them they are connected with the severity of damage. So it is necessary to estimate the presence of shock in 26.20/o of the casualties, who were subjected to the dressing of vessel. However, shock was caused not by the dressing of vessel, but by the heavy wound of thigh with the damage of vessel, which were being escorted/tracked by blood loss and painful reflexes as a result of which by cut was decreased the resistivity of organism.

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The complications of osteomyelitis had in 41.90/o of wounded, subjected to the removal/distance bone broken ends, and 39.00/o of

casualties, which produced the treatment of bone fragments. This large quantity of the complications of osteomyelitis is explained by the fact that in spite of so radical a removal/distance of the nonviable sectors of bone during primary surgical treatment, necrotic tissues nevertheless remain in the wound and condition the development of infection after the treatment of wound.

In the clinical example, given on pg. 407, it is indicated that apropos of the large-splintered break of femoral bone during the primary surgical treatment was produced the being all-inclusive treatment of bone and nevertheless in the rear hospitals it was necessary to produce two additional operations/processes in order to remove sequestrations and to eliminate septic phenomena in casualty. In spite of the produced operations/processes, casualty was discharged with the presence of fistula and osteomyelitis.

Clinical observations of the casualties, in whom was produced the most radical treatment of bone wound with subperiosteal removal/distance of all fragments and subperiosteal resection of the basic fragments of bone, and subsequently nevertheless developed the phenomenon of osteomyelitis with the sequestration of the bone, which was seeming undamaged/uninjured, they testify about the progressive necrosis, about the so-called secondary necrosis of bone, which occurs with many bullet breaks, in spite of the radical treatment of

fragments and the removal/distance of bone fragments.

To in exactly the same manner it is necessary explain sufficiently high percentage (26.8) of the septic complications, which developed as a result of the significant severity of damage, in spite of the radically produced treatment of bone fragments.

Need to perform radical treatment was in direct dependence on the severity of damage (break) as this is already indicated earlier and, in spite of this treatment, with the heaviest breaks was observed a great number of complications (table 168).

As show given data, with the crushed breaks the frequency of complications was considerably more than with all breaks of thigh.

In the treatment of the bullet breaks of thigh the army hospitals played important role, since basic measures, on which depended further fate of casualty, it was conducted precisely in them.

Table 168. Frequency of complications with the different breaks of thigh (to 100 breaks).

(1) Вид перелома	(2) Осложнение		
	(3) шок	(4) анаэробная инфекция	(5) сепсис
(6) Все виды огнестрельных переломов бедра	7.7	12.3	9.5
(7) Раздробленный	17.8	20.3	18.3
(8) Крупнооскольчатый	6.2	7.8	9.9
(9) Мелкооскольчатый	17.4	8.2	16.4

Key: (1). Form/species of break. (2). Complication. (3). shock. (4). anaerobic infection. (5). sepsis. (6). All forms/species of bullet breaks of thigh. (7). Crushed. (8). Large-splintered. (9). Small-splintered.

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The measures, conducted in the army area, consisted of the following:

a) the diagnosis of break was more precisely formulated and was detailed, that as in the army area casualty it for the first time underwent x-ray examination (16.6c/c);

b) was completed the surgical treatment of wounds, if this was not made in the preceding stage;

c) was produced repositioning of bone broken ends;

d) for the first time was used therapeutic immobilization.

The system of stage treatment with the evacuation according to the designation/purpose, accepted in the Red Army even to the Great Patriotic War, had especially important value during the treatment of the bullet breaks of thigh, since for the provision of these casualties with the being all-inclusive specialized surgical aid was required special technical equipment and equipment (the X-ray room, plaster tables, driers, equipment for skeletal/skeleton traction/extension, etc.) who were only in the specialized hospitals.

As noted above, the majority of casualties with the bullet break of thigh (73.80/o) underwent primary surgical treatment on DMP and 18.70/o - in KhPPG of the first line. On DMP gypsum bandage was laid for the therapeutic target not more than 10.00/o of casualties; by remaining casualty it was superimposed in the army and front line hospitals. With the perforating bullet wounds with the perforated or edge/boundary damage to femoral bone, with the smooth wound canal, with the insignificant damage of soft tissues and with the favorable course frequently it was not the necessity for the primary surgical treatment. For example, according to V. A. Spiv's data, 15.00/o of casualties with the bullet break thighs did not need primary surgical

processing on DMP. Clinical course in the significant part of these casualties after their entry into the army specialized hospitals did not suggest fear; therefore in these hospitals such casualties did not undergo primary surgical processing. In the army hospital by this casualty was produced only the repositioning of broken ends, if in this proved to be need, was laid therapeutic gypsum bandage and was produced further evacuation according to the designation/purpose.

From other casualties under comparatively favorable conditions proved to be those, which although needed surgical processing, they were evacuated from DMP into the specialized army hospital in the first 24 hours after wound, without operation/process. By such casualty shortly and under more favorable conditions were produced surgical processing, reposition of broken ends and immobilization with gypsum bandage.

Sufficiently significant group (22.60/o) composed casualties with the bullet break of the thigh which on DMP or in KhPPG of the first line produced primary surgical processing, and in the army specialized hospital - secondary surgical treatment.

Readings/indications to the secondary surgical treatment were made on the basis of the general condition of casualty and common clinical picture taking into account data of x-ray examination. In a

number of readings/indications to the secondary surgical processing in the specialized hospitals they occurred: the remaining uneliminated/unremoved large/coarse foreign bodies, the numerous fragments of bones, which lie freely at the soft tissues out of the bond with the basic bone fragments, the continuous hemorrhage and significant inflammatory changes in the wound in the presence of the general/common/total heavy reaction of organism (high temperature, frequent pulse and respiration, pain in the wound, the oppressed mood).

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In certain cases secondary surgical processing was caused by deficiency or technical errors in the primary surgical processing on DMP or in KhPPG of the first line as a result of the absence of preliminary x-ray examination or incomplete local anesthesia.

However, in a number of cases of reading/indication to repeated surgical interventions they appeared also after the primary surgical processing, produced most completely, it is radical taking into account roentgenological data by experienced surgeons.

This was explained, first of all, by difficulty, and sometimes also by the impossibility accurately to recognize during the primary

surgical perfecting of the boundary of the dissemination of primary traumatic necrosis.

Furthermore, not one most radical surgical processing could avoid the secondary necrosis of bone fragments and basic fragments of bone and its surrounding soft tissues as a result of those developing in further course of the wound of the disorders of blood circulation, caused by inflammatory edema and thrombosis of vessels.

Therefore in a number of cases it was necessary to resort to the secondary surgical processing, and then to reiterative repeated surgical interventions.

Of 22.60/o of repeated surgical interventions in army and army area 5.00/o they fell for the more radical surgical processing of wound which consisted in splitting up or carving of soft tissues to the bone for the elongation/extent of wound, and also in processing of bone. Carving underwent crushed of the edge of skin, fascia, nonvital bits of muscles and pericosteum. Were dissected all pockets in the soft tissues. Were removed the bone fragments, not connected with the periosteum and with the muscles. Sharp/acute bone prominences were smoothed by cutting pliers. Sometimes when the ends of the broken ends proved to be crushed, contaminated or those deprived of periosteum for the significant elongation/extent, was

produced the economical resection of the ends of the broken ends. were removed also those foreign bodies, which revealed from the course of operation/process. To operating wound into the volume was added funnel-shaped belled form, turned towards the outside. With the carving of soft tissues, of course, spared the vessels and nerves. Was produced thorough hemostasis.

In the majority of the cases such wounds abundantly filled by sulfanilamide preparations or irrigated by 2-3o/o solution of chloramine. Some surgeons so that the external unit of the wound rapidly would not be occluded, herred a deep fascia to the skin edges of wound. Was allowed/assumed the drainage of wound by moistened by one or the other antiseptic fluid/liquid and loosely introduced tampons.

Sometimes during the radical surgical processing of the infected wound bone broken ends proved to be exposed from the periosteum and crushed for the large elongation/extent, the viability of these broken ends causing large doubt. In such cases frequently was produced the resection of fragments. Was obtained large diastasis with the education in certain cases subsequently of dummy joint. With the retention/preservation/maintaining of periosteum was possible the regeneration of bone even after the resection of fragments on large extent. Of afterward prolonged (it is sometimes more than year)

immobilization in a number of cases nevertheless it was possible to attain the regeneration of bone to the full/total/complete consolidation of break.

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In other cases, during the simultaneous resection of periosteum at a great distance, was developed the dummy joint for recovery of which subsequently was necessary osteoplastic operation/process.

Repeated operations in the army area with the bullet breaks of thigh carried the following character/nature (table 169).

The frequency of repeated operations/processes in the army and front line area after primary surgical processing was different. Thus, after splitting up repeated operation/process in the army or front line area was required into 46.20/o of cases, after carving - into 56.00/o of cases, after splitting up with the dressing of vessels - into 64.60/o, after the removal/distance of foreign bodies - into 50.30/o, after the removal/distance of bone fragments - into 59.40/o, and after processing of the basic fragments of bone - into 56.10/o of cases.

The heavier there was the break, and consequently, the more

complex there was the primary processing, the more it was required repeated operations/processes.

Repeated surgical processing with the bullet breaks of thigh was performed in the significant part of the cases in the army specialized hospitals or in the front line hospitals which during the combat operations/processes advanced to the line of the army specialized hospitals.

The frequency of repeated operations/processes in the army and in the army area depending on the character/nature of break was the following (in the percentages): with the perforated breaks - 13.3, with the edge/boundary ones - 14.1, with the cross ones - 15.1, with the oblique ones - 17.5, with the large-splintered ones - 21.6, with those packed in - 21.6, with the small-splintered ones - 22.4, with the longitudinal ones - 25.7, with those crushed - 32.3.

Given data show that repeated surgical interventions in the army area with the bullet breaks of thigh most frequently underwent the casualties with the crushed break of the thigh by which was performed the more radical surgical processing, amputation or exarticulation.

Among the readings/indications to the amputation the first place occupied crushing tissues, the second - anaerobic infection and the

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third - wound of vessels.

Of all amputations and exarticulations, produced after the primary surgical processing of the bullet breaks of thigh, 51.00/c fall to the army area.

Table 169. Character/nature of repeated operations/processes with the bullet breaks of thigh in the army area (in the percentages).

(1) Ревизия раны	(2) Обработ- ка кости	(3) Вскры- тие зате- нов	(4) Перевяз- ка сосу- дов	(5) Ампута- ция	(6) Удаление септест- ров	(7) Прочие операции	(8) Итого повторно опериро- вано	(9) Не опе- рировано
4,6	5,0	4,0	0,5	7,1	0,4	1,0	22,6	77,4
							100,0	

(1). Examination of wound. (2). Processing bone ¹.

FOOTNOTE ¹. The removal/distance of bone fragments, of foreign bodies and processing fragments are connected together. ENDFOOTNOTE.

(3). Autopsy of flows. (4). Dressing of vessels. (5). Amputation.
 (6). Removal/distance of sequestrations. (7). Other
 operations/processes. (8). Is altogether it is repeatedly operated.
 (9). it is not operated.

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Summing up the results of surgical activity in the stages of evacuation with the bullet breaks of thigh, it is necessary to note that, together with an improvement in the quality of the specialized aid during the Great Patriotic War by casualty, it was increased and the number, which it proved to be. To this to a considerable extent

contributed from year to year the improved medical-tactical circumstances, increased/grown experience of the numerous cadres of the surgeons, improvement in the leadership/manual and timely utilization of an experiment/experience of the preceding years of war.

As the illustration of this position/situation serve some resultant data of one of the fronts, represented in table 170.

The increased operational activity in the army and army area at this front during the Great Patriotic War with the bullet breaks of thigh, naturally, was escorted/tracked by the decrease of operability in the front line hospitals. A quantity of gypsum bandages, superimposed in army specialized hospitals, in the second half-year of 1944 increased 3 times in comparison with the first half-year of 1944.

The periods of rendering to the specialized surgical aid with the bullet breaks of thigh during the Great Patriotic War were shortened (table 171).

Table 170. Operability and the application of gypsum dressings in the stages of evacuation the casualties have with the bullet break of thigh in the individual reporting periods on by N- front (in the percentages to a number of casualties, the pasts through this stage).

(1) Отчетный период	(2) Оперируемость по районам			(3) Наложение гипсовой повязки по районам	
	(4) войско-вой	(5) армей-ский	(6) фронто-вой	(7) армей-ский	(8) фронто-вой
(9) Октябрь 1943 г.	75,0	26,0	—	—	—
(10) С июня 1943 г. по июль 1944 г.	—	28,5	—	—	—
(11) Первое полугодие 1944 г.	—	57,9	30,6	20,1	68,3
(12) Второе полугодие 1944 г.	75,0	67,0	21,0	61,9	77,0
(13) 5 месяцев 1945 г.	78,5	71,0	—	70,9	70,9

Key: (1). Accounting period. (2). Operability by areas. (3).

Application of gypsum dressing by areas. (4). army. (5). army. (6). front line. (7). October. (8). From June 1943 through July 1944. (9). First half-year of 1944. (10). Second half-year of 1944. (11). months.

Table 171. Period of rendering to the specialized surgical aid with the bullet breaks of thigh during the rout of the Germans in the environs of Moscow and in the environs of Berlin (in the percentages).

(1) Боевая операция	(2) Сроки оказания специализированной помощи					(7) Итого
	(3) первые сутки	(4) вторые сутки	(5) 3-6-е сутки	(6) 7-10-е сутки	(8) позже 10 суток	
(8) Разгром немцев под Москвой	—	12,5	12,5	37,5	37,5	100,0
(9) Разгром немцев под Берлином	11,2	22,2	38,9	5,6	22,1	100,0
	72,3					

Key: (1). Combat operation/process. (2). Period of rendering to that specialized aid. (3). first day. (4). second day. (5). days. (6). it is later than 10 days. (7). Altogether. (8). Rout of Germans in the environs of Moscow. (9). Rout of Germans in the environs of Berlin.

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From the antiseptics with the bullet breaks of thigh both in the army and in the army area most frequently were used sulfanilamide preparations and chloramine. On many surgeons' responses these antiseptics, in particular sulfanilamides, played positive role in the treatment of these heavy damages.

Penicillin as new preparation during the Great Patriotic War did

not have time to receive wide acceptance, and therefore it could not show/render that medicinal activity on a mass scale, which to it is specific as to powerful/thick antihetic.

As is known, transport splints provide only relative rest of both entire extremity and damaged bone, immobilizing broken ends in that position/situation, in which they were established/installed after break.

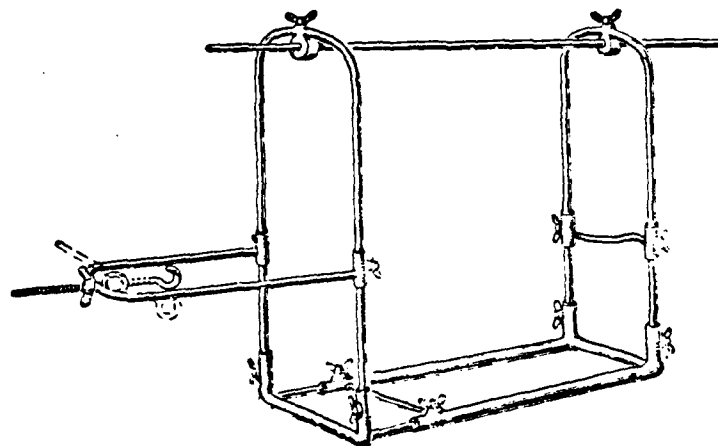


Fig. 155. Perfected extension apparatus of Boehler's system for the shin.

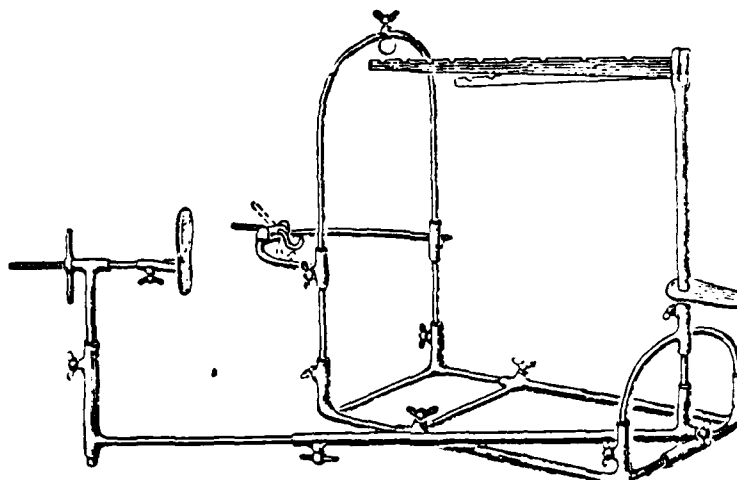


Fig. 156. Doubled extension apparatus of Boehler's system the construction/design of the institute im. N. V. Sklifosovskiy.

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But also this problem was not always realized by a transport splint; in many instances the small shortening with the breaks of thigh, which could be easily removed on DMP by simple manual thrust, in the observations of many authors, considerably it was increased as patient advanced in the stages of evacuation.

In many instances of bullet fractures of thigh repositioning of broken ends was produced after the radical surgical processing of wound by one-time traction/extension on the special orthopedic tables

and the apparatuses (Fig. 41, 155, 156, 157, 158 and 159) in army specialized KhPPG.

A number of the authors (M. N. Akhutin, S. I. Banaytis, A. N. Berkutov, A. A. Bocharov, M. S. Lur'ye et al.) sufficiently extensively used upon transfer with the transport to the therapeutic immobilization skeletal/skeleton traction/extension.

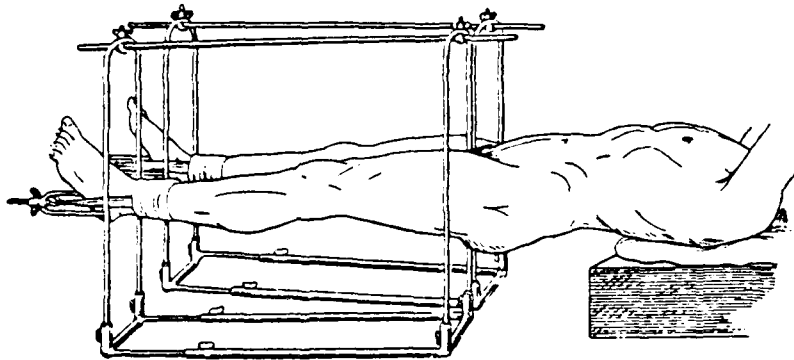


Fig. 157. Two apparatuses for the shin (Fig. 155) are set by series/number and are adapted for the application of hip gypsum dressing.

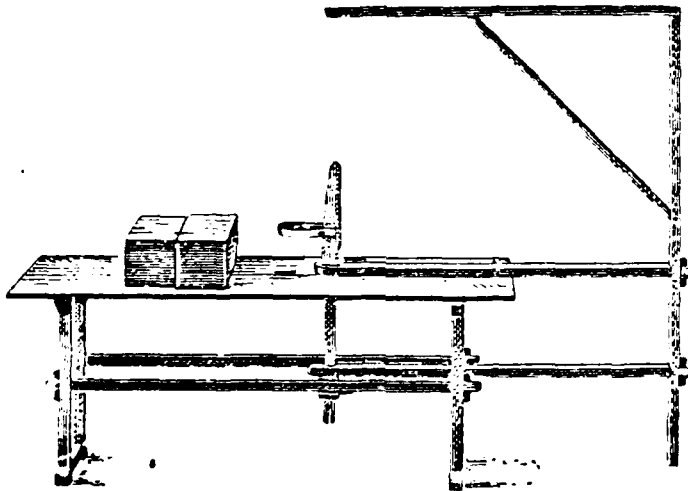


Fig. 158. Demountable orthopedic table of construction/design KhPPG 1944.

But in the majority of army and front line hospitals surgeons put to use the method of one-time setting of broken ends on the special apparatuses or the orthopedic tables. Such apparatuses in second half of war existed almost in all army specialized hospitals.

Fitted out for operation under field conditions the tables of the numerous authors (Ya. G. Dukrov, V. T. Razumovskiy, I. G. Turcvets et al.) found use in the army and front line specialized hospitals for those wounded the thigh. On one and the same orthopedic table it was to completely possibly perform the surgical processing of wound, to reposition broken ends and put gypsum bandage, without shifting patient.

Skeletal/skeleton traction/extension in essence was produced in the front line and rear specialized hospitals. Skeletal/skeleton traction/extension was used, first of all, in such cases where the gypsum bandage was contrasted, where was required observation of the wound, i.e., with the suppurative flows, during the damage of large vessels, with strong edemas of extremity and with the impossibility of single-moment traction/extension to amend the position/situation of broken ends. Skeletal/skeleton traction/extension required the periods of different duration. N. N. Yelanskiy, S. I. Banaytis, A. N.

Berkutov minimum period for the skeletal/skeleton traction/extension considered 1-2 weeks, until are established/installed broken ends and falls temperature. Then only it is possible to change to the long-term gypsum bandage. A. N. Berkutov's proposition to use with edemas and suppurative flows glue or adhesive traction/extension did not find wide acceptance, since in this case occurred maceration of skin. During the contraindications to the one-time or prolonged skeletal/skeleton traction/extension better it was put on several days traction/extension for the shin and for the foot with the small cargo (5-6 kg.) through the soft or gypsum lady's mantle, until it proves to be possible to produce one-time on the apparatuses repositioning of broken ends or to change to the prolonged skeletal/skeleton traction/extension with the subsequent gypsum bandage.

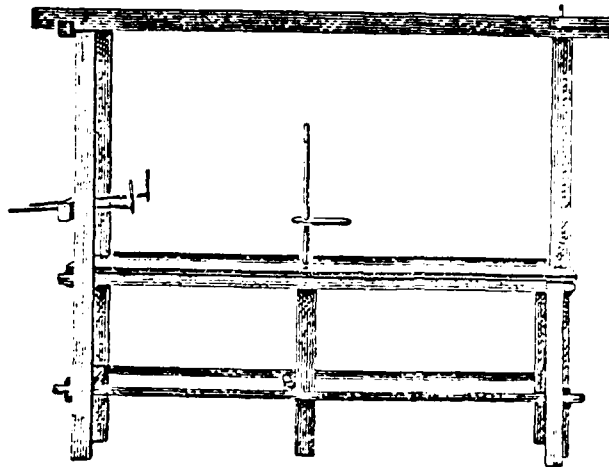


Fig. 159. The demountable orthopedic table of the construction/design KhPPG 1944 the author of construction/design the Major of medical service is wry-nosed.

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Not less important role in the treatment of the bullet breaks of thigh played the immobilization of the damaged extremity. As the transport immobilization with the bullet breaks of thigh after primary surgical processing they were used: the splint of Diedrich - into 63.30/o of cases, wire splint - into 9.40/o, Vinogradov's splint - into 3.70/o, deaf gypsum bandage - into 3.60/o, gypsum splint - into 1.90/o and into 18.10/o of cases other splints whose character/nature was not established/installed.

Thus, Diedrich's splint within the time of the Great Patriotic War with the bullet breaks of thigh as the transport splint was used most frequently. But nevertheless 13.1c/o of casualties put to use the splints of Cramer and Thomas - Vinogradov, which proved to be barely suitable for the immobilization of the break of thigh.

In further stages of evacuation transport immobilization was replaced by therapeutic (table 172).

As therapeutic immobilization with the bullet breaks of thigh was used into 61.7o/o deaf gypsum bandage, into 22.7o/o - gypsum and other splints, into 0.8c/o - skeletal/skeleton traction/extension, into 12.3c/o - skeletal/skeleton traction/extension with the subsequent or preceded gypsum knit also into 2.5o/o - other forms/species of fixation.

As showed the experiment/experience of the Great Patriotic War, deaf gypsum bandage among the methods of therapeutic immobilization in the army and front line area occupied the first place. And if we during the first year of war lay large gypsum bandages knew how only individual doctors, then subsequently gypsum technology mastered not only doctors, but also persons of average/mean and junior medical composition. Latter/last became specialist-cast appliers which under doctors' leadership/manual wonderfully managed this task.

Despite the fact that almost all surgeons during the Great patriotic war arrived at the conclusion about the advantage of long-term deaf gypsum bandage, nevertheless into 38.30/o of bullet breaks of thigh it as the therapeutic immobilization was not used for a number of reasons, namely:

a) during the large displacement did not always manage by one-time traction/extension on the special apparatuses or the orthopedic tables correct to establish/install broken ends; in these cases usually preliminarily were laid the skeletal/skeleton traction/extension during 3-4 weeks, and then the already gypsum bandage in which casualty they evacuated for further treatment; this order/formation was observed into 5.00/o of cases;

b) in the cases of the wounds, complicated by the infection when wound was must be kept constantly accessible for the observation and operational interventions.

Table 172. Therapeutic immobilization of the bullet breaks of thigh in stages and time of its use/application (in the percentages).

(1) До 10 дней			(2) 11-20 дней			(3) Больше 20 дней		(7) Всего
ДМП	(4) армейские госпитали	(5) прочие	ДМП	(4) армейские госпитали	(5) прочие	(6) ДМП и армейские госпитали	(5) прочие	
8.1	33.4	16.3	0.1	8.5	15.9	2.9	14.8	100.0

Key: (1). To 10 days. (2). days. (3). It is more than 20 days. (4). army hospitals. (5). other. (6). DMP and army hospitals. (7). In all.

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c) with the severe associated diseases and the wounds of light ones and organs/controls of the abdominal area where it was not possible to fix/record with bandage of the pelvis and torso;

d) with the doubt of the thoroughness of surgical processing; in the presence of extensive suppurative flows;

e) during the anaerobic infection and with the suspicion to it even after wide splitting up; in such cases before the elimination of the danger in anaerobic infection preference was given to traction/extension (N. N. Yelanskiy, Ya. S. Istoriik);

f) during the damage of large vessels and after their dressing when the viability of extremity was explained sometimes during several days;

g) with significant edemas of extremity: the early superimposed circular gypsum bandage could increase edema, in particular, if were allowed errors in the technology of its application; whereas during the favorable clinical course of the wound when under the gypsum bandage edema dropped, through several days the bandage became free and ceased to serve as the substance of immobilization.

In all enumerated cases in the army area they abstained from the application of circular gypsum dressing and the significant part of these casualties they evacuated in one or the other transport splints.

Among those evacuated from the army area without the circular gypsum bandage, especially during the first years of war, the large part comprised those casualties, who as a result of the overload of the army hospitals directly were directed for the front line hospitals in the standard transport splints or in the gypsum casts, sometimes even without the radical surgical processing.

It is necessary to note that, in spite of the very wide

acceptance of circular gypsum bandage in the army specialized hospitals, nevertheless here were sometimes noted shortages both in the readings/indications to its imposition and in technology itself. Sometimes gypsum bandage was used without the sufficiently radical surgical processing, without the sufficient reposition of broken ends. But one of the most frequent deficiencies in the technology of the application of coxitic gypsum dressing was the absence of its modelling. This was explained by the fact that some doctors did not use the modelling technique of gypsum bandage on the bone prominences - the combs of iliac bones, on muscles of thigh, to knee cap, tuberosity of the tibia and to the ankles/malleoli in the position/situation stops at the right angle. Only this gypsum bandage, as "machine tool", solidly fixed/recorded the broken ends of the broken thigh (pg. 137, Fig. 46). On the quality of gypsum bandage to a considerable extent depended correct treatment and convenience in the evacuation of casualty. E. G. Leshchinskiy on the basis of 300 observations of the bullet breaks of thigh under conditions of front rear reported that into 32.00/o for it it was necessary on the different reasons to remove/take the superimposed in the army area gypsum I will knit (heavy general condition of casualty, secondary hemorrhage, the incorrect position/situation of broken ends and the decomposition of bandage as a result of the abundant soaking by pus or the bad quality of gypsum). The author noted also the insufficient reposition of broken ends and the poor modelling of gypsum bandage.

According to Kh. D. Gadzhiyev's data, in the army specialized hospital after 8-12 days after the surgical processing of wound into 3.80/o cases due to the developing anaerobic infection it was necessary to remove/take the gypsur bandage, superimposed in the foremost stages of evacuation.

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According to the observations of K. F. Ivan'kovich, that relate to army evacuation hospital (1943), 37.00/o of superimposed in the hospital gypsum bandages were on the different reasons changed in the same hospital, and from a number of those evacuated from this hospital for the front line area they were sent for the deep rear through the different periods without the shift/relief of gypsum bandage 64.00/o of casualties.

A question about the quality of medical gypsum during the Great Patriotic War acquired sometimes extremely high value. During the mass use/application of deaf gypsum bandages in the army and front line specialized hospitals was required a large quantity of high quality and strongest/most durable gypsum. The quality of gypsum was to a considerable extent connected with the conditions for its packing, delivery/procurement and storage which during the war were not always favorable. It was frequently necessary to change the series/number of gypsum bandages immediately after their imposition due to the spoiling of gypsum.

With the poor quality gypsum was expended/consumed a large quantity of gauze, bandage they were very heavy, but at the same time unstable. But if had the capability to use high quality strong/durable gypsum, then bandages were obtained the lungs and at the same time strong/durable, in spite of their considerably smaller thickness.

Shift/relief of gypsum bandage due to the bad quality of gypsum, besides the excess labor input, energies also of materials, unfavorably was reflected to the healthy/sound ones of casualties whose shift/relief of bandage, unavoidably connected and more trauma, sometimes made the course worse of wound process.

However, the large part of the superimposed in army KhPPG deaf gypsum bandages, creating the best conditions of rest during the evacuation of casualties with the bullet break of thigh, was changed only in the rear specialized hospitals.

Finally, the important element/cell of the work of the specialized osteoarticular hospitals was the acceleration of the drying out of gypsum bandages to the full/total/complete solidification.

In summer in the solar weather it was possible to attain the

rapid drying out of gypsum bandages in the open air or in the special drying wards where always was maintained high temperature at a good ventilation. Gypsum bandage dried up in such quarters/premises during 2 days. For the more rapid drying out of gypsum bandages in many hospitals at the different fronts were designed drying furnaces: "Along the pipes/tubes, which go from the tin kiln, imbedded into the small brick furnace, the stream of hot air was directed directly to gypsum bandage. Utilization of a stream of hot air gave the possibility in 1-2 hours to considerably dry slightly gypsum bandage, but for its final drying out casualty had to remain in the drying ward in the course of twenty-four hours" (V. T. Razumovskiy).

How are solidly toward the end the wars assimilated were by the surgeons of the basis of gypsum technology, is shown the report of the chief surgeon of a N- skiy front N. N. Yelanskiy in 1945. According to his data in the Budapest operation/process in the army and front line hospitals the casualty on the arrival in the hospital only one time under morphine stupefaction was shifted from the stretchers to the operating table, and he was removed/taken from the table already in the finished gypsum bandage, after which it entered drying room, and then into the hospital separation/section.

Very organization of the application of gypsum dressing toward the end of the war achieved significant perfection.

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"The capacity of one plaster brigade, says N. N. Yelanskiy in its report, it achieved to 40 large gypsum bandages in the day. This ordered system made it possible already in the army area to change for the majority of casualties with the bullet break of thigh transport immobilization to the therapeutic, which to a considerable degree facilitated the condition of the evacuated casualties".

Clinical course treatment of the bullet breaks of thigh in front line and rear evacuation hospitals.

Clinical course of the bullet breaks of thigh.

Docent is the Major of medical service L. Ye. Rukhman.

The clinical course of the bullet breaks of thigh in the Great Patriotic War was characterized by extreme diversity and depended on a number of factors. Presence and the character/nature of the associated damage of other organs/controls and tissues, presence and the degree of their escorting/tracking shock and blood loss, the severity of the added infection, the character/nature of wound and the form/species of the wounding shell, form/species and the level of break, period and the character/nature of rendering to first aid and imposition of transport immobilization, period and the volume of the primary surgical processing of bullet wound, the procedure of the undertaken subsequent treatment, the general condition of casualty before the wound and his age - all this had a vast effect on the pattern of the clinical flow of the bullet breaks of thigh.

In a number of cases, how it is possible to judge based on

materials of author's development and personal observations, the clinical course of the bullet breaks of thigh in principle differed little from the closed break: small wound, simple break and insignificant blood loss were not escorted/tracked by shock, temperature and general condition of casualty 5-6 days after wound came to the norm, pains disappeared, subsequently the process of the healing of wound and fracture proceeded smoothly, and toward the end of 3-4 months attacked/advanced full/total/complete recovery. However, in the greater unit of the cases the bullet breaks of thigh were escorted/tracked by the fact of another complication (shock, blood loss, sepsis, anaerobic or pyogenic infection), which attacked/advanced soon after wound or through the specific period after it. Form/species, character/nature and the severity of the added complication, and also the individual resistivity of the organism of casualty determined with to this form and severity of clinical course in each individual case.

To come to light/detect/expose such form of clinical course which it would be possible to entirely consider typical for the bullet breaks of thigh, is very difficult.

However, on the basis of the given below materials it is possible to assume that and in the Great Patriotic War the bullet breaks of thigh were continued to remain one of the most serious

damages of wartime, and their clinical course, in spite of significant in this respect successes in comparison with the last wars, it was still fairly often escorted/tracked by numerous severe complications, which is explained by the special massiveness of wounded muscular groups, by the violation of the important link of the supporting-motor apparatus, which extremely difficultly yields to immobilization, by the intensity of the nervous reflex impulses/moments/pulses, which affect the cerebral cortex, and by the conditions, which favored the development of heavy infectious process as a result of the abundant contamination of wound by microflora.

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Organization in recent years of war in all stages of evacuation, beginning from the army area, the constant specialized hospitals for the treatment of the breaks of thigh, manned by special cadres and equipped by the appropriate armament, to a considerable degree contributed to a descent in the severity of the clinical course of the bullet breaks of thigh and provided favorable clinical outcome.

Based on materials of the deepened development of the histories of disease/illness, almost third (30.60/o) of all casualties with the break of thigh had the associated wounds of other organs/controls and tissues. The bullet breaks of thigh were escorted/tracked into by

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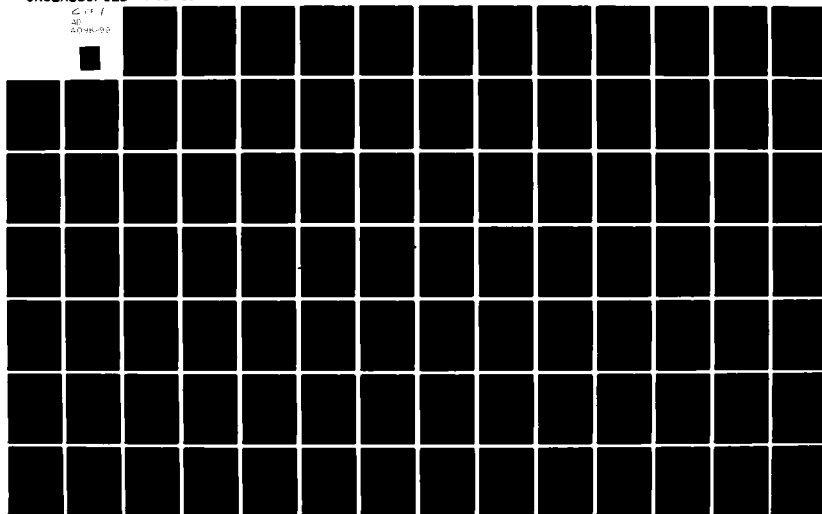
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EXPERIENCE OF SOVIET MEDICINE IN A GREAT PATRIOTIC WAR 1941-194--ETC(U)
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8.00/o damage of large/coarse blood vessels, into 10.60/o - by damage of nerves and into 7.70/o - by shock. Anaerobic infection was observed into 12.30/o of cases, sepsis - into 9.50/o, suppurative arthritis - into 2.90/o, festering - into 26.30/o and osteomyelitis - into 31.10/o. More than half (from 59.4 to 64.60/o) of all casualties with the bullet break thighs underwent in the stages of evacuation repeated surgical interventions (pg. 162). The amputation of thigh is produced in 17.10/o of casualties. The duration of the stay of casualties with the break of thigh in the hospitals of different stages of the medical evacuation on the average was equal to 6.1 months.

Complications in the significant percentage of the cases and 17.10/o of amputations determine the significant severity of clinical course. However, if we compare the noted frequency of the amputations, produced with the bullet breaks of thigh during the Great Patriotic War, with Americans' data (quoted according to M. N. Akhutin) for the first world war 1914-1918, where the amputations were produced in 36.70/o of casualties with the bullet breaks of thigh, then the achievements of Soviet medicine in the region of the treatment of the bullet breaks of thigh will prove to be doubtless.

Complications with the bullet breaks of thigh were distributed in the stages of evacuation as follows (Table 173).

From Table 173 it is evident that the clinical course of the bullet breaks of thigh was connected with the multifeature severe complications in all stages of evacuation. In onset and preponderance of one or the other form/species of complication in the individual stages of evacuation was observed the known regularity, which was being determined by the time, which passed from the moment/torque of wound.

Table 173. Distribution of the complications of the bullet breaks of thigh in the stages of evacuation (in the percentages).

(1) Этапы эвакуации	(2) Осложнения					
	(3) шок	(4) анаэроб- ная ин- фекция	(5) сепсис	(6) гнойный артрит	(7) гнойное- ние	(8) остеоми- елит
(9) лечебные учреждения войскового района...	86.7	18.0	2.3	3.5	2.4	—
(10) Армейские госпитали,	11.7	65.6	35.6	31.2	32.9	1.3
(11) Фронтальные госпитали	1.3	14.8	43.7	45.1	38.5	6.6
(12) Тыловые госпитали	0.3	1.6	18.4	20.2	26.2	92.1
(13) Итого . . .	100.0	100.0	100.0	100.0	100.0	100.0

Key: (1). Stages of evacuation. (2). Complications. (3). shock. (4). anaerobic infection. (5). sepsis. (6). suppurative arthritis. (7). festering. (8). osteomyelitis. (9). Therapeutic installations of army area. (10). Army hospitals. (11). Front line hospitals. (12). Rear hospitals. (13). Altogether.

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Casualty with the bullet break of thigh was situated on the first hours and day after wound in the army area; therefore more than 4/5 all cases of shock with the bullet breaks of thigh were to the army area; 2/3 all cases of anaerobic infection with the bullet breaks of thigh were observed in the army area, where casualty entered the first days after wound; whereas a great number of suppurative and septic complications fell to the front line area, and osteomyelitis -

to the rear hospitals, where casualties entered later periods after wound.

The effect of period, character/nature and volume of the undertaken medical aid with the bullet breaks of thigh on their clinical course and frequency of the subsequent complications is widely-known. Materials on this question are given in chapter "First, first medical and first medical aid and transport immobilization with the bullet breaks of thigh".

It is necessary to explain, which there was the dependence between the principal forms/species of complications and the form/species of break, its level, character/nature of wound and type of the wounding weaponry, and also age of casualty.

the data about the dependence of complications on the form/species of the break are represented on materials of the deepened development of the histories of disease/illness, in Table 174, from which it is evident that the complications of anaerobic infection, by sepsis, by festering and by osteomyelitis were observed with all without the exclusion forms/species of the bullet breaks of thigh, whereas the complication of shock and by suppurative arthritis occurred in all forms of the break of the thigh, with exception packed in, with which neither shock nor suppurative arthritis in no

way were observed. In this case the frequency of one or the other complications to the very significant degree was determined by the form/species of break. Thus, with the perforated breaks of thigh anaerobic infection was observed 6 times, sepsis 7 times, and shock is 22 times less frequent than with the crushed breaks. Suppurative arthritides, on the contrary, were encountered with the longitudinal and perforated breaks more frequently, rather than with those crushed, which can be explained by the fact that the perforated breaks more frequently are localized in the spongy substance of epi-metaphysis of thigh.

Table 174. Frequency of early and late complications in the various forms of the break of thigh (in the percentages).

(1) Вид перелома	(2) Осложнения					
	(3) шок	(4) анаэроб- ная ин- фекция	(5) сепсис	(6) гнойное	(7) остео- миелит	(8) гнойный артрит
(9) Дырчатый	0,8	3,2	2,4	21,4	27,4	3,8
(10) Поперечный	3,9	8,3	9,7	25,4	41,5	1,5
(11) Продольный	2,9	5,7	5,7	42,9	34,3	5,7
(12) Косой	4,1	4,1	7,1	26,1	32,2	1,4
(13) Раздробленный	17,8	20,3	18,3	25,5	29,2	3,3
(14) Крупнооскольчатый	6,2	7,8	9,9	31,7	45,7	2,7
(15) Мелкооскольчатый	17,4	8,2	16,4	38,1	47,0	3,7
(16) Краевой	2,5	3,4	2,7	28,4	28,6	3,1
(17) Вколоченный	—	5,4	2,7	27,0	24,4	—
(18) Перелом	12,2	28,3	24,7	16,8	14,6	3,8
В среднем	7,7	12,3	9,5	26,3	31,1	2,9

Key: (1). Form/species of break. (2). Complications. (3). shock. (4). anaerobic infection. (5). sepsis. (6). festering. (7). osteomyelitis. (8). suppurative arthritis. (9). Perforated. (10). Cross. (11). Longitudinal. (12). By sand bar. (13). Crushed. (14). Large-splintered. (15). Small-splintered. (16). Edge/boundary. (17). Packed in. (18). "Break". (19). On average.

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Thus, for instance, based on materials of the deepened development of the histories of disease/illness, the perforated breaks of thigh in middle third were observed altogether only into 2.40/o.

The dependence between the level of the break and the subsequent

principal forms/species of complications is represented in Table 175.

According to Tables 175, the complications of anaerobic infection, by sepsis and by osteomyelitis were observed with the breaks of thigh in upper third more frequently than with the breaks in lower third. However, on the degree of the frequency of the complication of shock (without the accounting to the degree of its severity) the level of the break of thigh noticeable effect did not have.

The data, which concern the effect of the form/species of the wounding shell on the frequency of one or the other severe complication with the bullet breaks of thigh, are represented in Table 176.

From the preceding information it is evident that with the breaks of thigh as a result of the fragmentation wounds the complication of sepsis was observed into $11/4$, by anaerobic infection - into $11/2$, and by shock 3 times more frequently, rather than with the breaks as a result of the bullet wounds. For the frequency of the complication of osteomyelitis the form/species of the wounding shell had a much smaller effect, although this complication nevertheless more frequently was observed with the fragmentation than with the bullet ones, wounds.

The effect of the character/nature of wound on the degree of the frequency of one or the other complications can be seen from the data of Table 177, namely: the bullet breaks of thigh with the blind-end wound were escorted/tracked by the complications of anaerobic infection, sepsis and osteomyelitis somewhat more frequently than with the perforating wound.

Table 175. Frequency of complications with the breaks of thigh at the different levels (in the percentages).

(1) Уровень перелома по третям	(2) Осложнения			
	(3) шок	(4) анаэроб- ная ин- фекция	(5) сепсис	(6) остеоми- елит
(7) Верхняя	7,0	12,8	11,4	33,4
(8) Средняя	7,4	12,6	8,9	34,8
(9) Нижняя	8,1	10,8	8,2	24,8
(10) Сочетания уровней	10,2	12,0	10,2	39,8
(11) В среднем	7,7	12,3	9,5	31,1

Key: (1). Level of break on third. (2). Complications. (3). shock. (4). anaerobic infection. (5). sepsis. (6). osteomyelitis. (7). Upper. (8). Average/mean. (9). Lower. (10). Combinations of levels. (11). On the average.

Table 176. Frequency of the complications of the bullet breaks of thigh with the zero and fragmentation wounds (in the percentages).

(1) Вид ранения	(2) Осложнения			
	(3) шок	(4) анаэроб- ная ин- фекция	(5) сепсис	(6) остеоми- елит
(7) Пулевое	5,5	9,5	8,6	29,8
(8) Осколочное	10,5	15,5	10,6	31,9

Key: (1). Means of wound. (2). Complications. (3). shock. (4). anaerobic infection. (5). sepsis. (6). osteomyelitis. (7). Bullet. (8). Fragmentation.

The effect of the character/nature of wound on the frequency of complications was especially expressed in the relation to the shock: the breaks of thigh with the blind-end wound were escorted/tracked by shock 11/2 times less frequent than with the perforating wounds. With the breaks of thigh, which were being escorted/tracked by disengagement or crushing of extremity, the complication of shock was observed almost 9 times more frequently than with the simple blind-end wounds. At the same time the breaks of thigh during the crushing were complicated by osteomyelitis 6 times less frequent than with the blind-end and perforating wounds, that it is possible to explain by the fact that during disengagements and crushings of thigh, as a rule, the amputation was produced even in the army area from the primary readings/indications.

On the effect of the age of casualty on the frequency of the complications of shock with artillery breaks of thigh it was possible to establish that the shock was observed in the wounded older than 40 years two times more frequently than in the casualties of younger age, that it is possible to explain by data of the analysis of the existing views to etiopathogenic traumatic shock with the bullet breaks of thigh.

Thus, the analysis of the given above materials deepened development of the histories of illness makes it possible to consider

that the diversity of the clinical course of the bullet breaks of thigh was determined by the development of the series/number of different complications: shock, blood loss, sepsis, anaerobic infection, osteomyelitis, etc. The frequency of one or the other complications was found in the definite dependence on many of the enumerated above factors, including on form/species and level of break, character/nature of wound and form/species of the wounding shell, and also on the age of casualty.

By the example of the clinical course of the bullet break of thigh, which was complicated by shock, by hemorrhage, by sepsis and then as osteomyelitis, can serve the following observation.

K. I. D. is wounded 11/VIII 1943 7 hours. In the card of forward area is noted the diagnosis: the perforating bullet wound of left thigh with the damage to bone. On DMP is superimposed the splint, on PMP 8 hours is superimposed the tourniquet as a result of the significant soaking of bandage by the blood, it is introduced to 2 cm³ of camphor oil and 1 cm³ 10/o morphine. Casualty it is evacuated "lying/resting" on DMP, where it arrived 12 hours with the tourniquet, in the condition of heavy shock; the pulse of 120 strikes/shocks per minute, weak filling; the blood pressure 60/40 mm of the mercury column. With the examination/inspection of wounded extremity is discovered in middle third of left thigh from the medial

side the inlet by the size/dimension 0.5x0.5 cm; outlet by the size/dimension 4x6 cm, it is arranged/located on the external surface.

Under the local anesthesia 0.25o/o solution of novocaine (500 ml) split entrance and outlet. Nonvital tissues are completely removed, emptied hematoma, are removed free bone fragments. Wound is powdered by the powder of streptocide, is superimposed bandage with chloramine and splint of Diterichs.

Table 177. Frequency of the different complications of the bullet breaks of thigh in the dependence on the character/nature of wound (in the percentages).

(1) Характер ранения	(2) Осложнения			
	(3) Шок	(4) анаэробная инфекция	(5) сепсис	(6) остеомиелит
(7) Сквозное	7,8	12,0	9,4	31,0
(8) Слепое	5,1	12,7	10,0	33,3
(9) Отрыв или размо- жение	43,8	10,7	5,3	5,1

Key: (1). Character/nature of wound. (2). Complications. (3). shock. (4). anaerobic infection. (5). sepsis. (6). osteomyelitis. (7). Through. (8). Blind. (9). disengagement or crushing.

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Are introduced the preventive doses of antitetanus serum. Is poured the blood in a quantity of 460 ml and antishock fluid/liquid 500 ml. Are assigned the injections of morphine and camphor.

Next day after operation/process condition satisfactory, temperature of 37.5-37.7°.

13/VIII it is evacuated in KhPFG, whereas where it arrived 17 hours of this day in the satisfactory condition with the strongly gotten wet bandage. Is produced changing of bandage. Wound by the

size/dimension 18x10 cm; is determined fragmented break. After the imposition of the splint of Diterichs the casualty is evacuated in another KhPPG, where he arrived 14/VIII 1943 4 hours; temperature of 38°; the pulse of 88 strikes/shocks per minute of satisfactory filling. Wound in a good condition. Is superimposed circular deaf gypsum bandage. 15/VIII on 18/VIII the temperature does not exceed 37.5°. Casualty with the gypsum bandage in the satisfactory condition is evacuated 19/VIII into the evacuation hospital. After the entry the pulse of 72 strikes/shocks per minute, temperature of 37°, complaint of the pain in the foot and the poor sleep. 19/VIII on 29/VIII the temperature subfebrile, which reaches in the evenings to 37.8°. 24/VIII to casualty is changed gypsum bandage. 29/VIII it was evacuated into the evacuation hospital, where it arrived 30/VIII. Is established/installed significant anemia, temperature of 40.1°, complaint of the pain in the left strut and the cough with the mucus of rusty color. During the auscultation of patient from the front in the lungs are heard out dry wheezes, from behind due to the superimposed gypsum bandage to listen. Large are assigned banks and sulfanilamides on the scheme.

2/IX is produced x-ray examination. Central broken end is displaced forward and laterally; in wound are determined bone broken ends and fine/small metallic foreign bodies.

2/IX on 5/IX the temperature to 38.5° in the evenings, complaint of the sharp pains in the foot; will not sleep but to nights, the appetite of poor.

5/IX is produced operation/process under narcosis (90 ml ether). Section/cut is expanded, removed bone fragments and cut away bone fragments, are opened suppurative flows in the soft tissues. Bone fragments are cross-linked with catgut; is produced contra-aperture from behind. Is superimposed gypsum bandage. Are poured 250 ml of the blood.

7/IX is made the control X-ray photograph, which revealed the displacement of the nearest broken end forward and outside.

5/IX on 17/IX temperature in the evenings to 38.2°. Condition of the patient of average/mean severity. The color of face "ashen", the lines of face were sharpened, the appetite of poor; it complains on the pain in the region of wound. Daily normal chair/stool.

17/IX - operation/process under ether anesthesia (50 ml). Through of start section/cut are bared the ends of the bone. Is produced setting of break, broken ends are cross-linked with catgut. Is superimposed deaf gypsum bandage. Are poured 450 ml of blood and 500 ml of physiological solution.

19/IX in the control X-ray photograph is discovered the satisfactory standing of broken ends. It is assigned inside streptocide 8.0 into the day and the camphor oil of 4 times in the day on 2.0.

18/IX on 15/X the temperature of constant character/nature of 37.5-39.5°; the pulse of 108-110 strikes/shocks per minute. Complains of overall weakness, the pains in the wound, the absence of appetite, poor sleep. In the month three times is produced the blood transfusion on 200 ml, the pouring in of glucose is intravenous and fault inward.

16/X the temperature was lowered, complaints he does not present.

15/XI is assigned therapeutic gymnastics and massage of healthy/sound extremity.

17/XI is taken/removed gypsum bandage. Wound by size/dimension 15x5 cm carried out by granulation, there is skimpy suppurative discharge. In the region of break in mobility there is: is noted the shortening of extremity on 7 cm. In the X-ray photograph is

determined the beginning of the education of the callus in the form of the clip, which unites both fragments.

18/XI is superimposed circular gypsum bandage.

18/XII gypsum bandage is taken/removed. Wounds by the size/dimension 13x4 cm and 10x2 cm. Consolidation is expressed well. In the X-ray photograph (frms 21/XII 1943 g) is determined the satisfactory standing of broken ends. In the thickness of the callus are foci of rarefaction/evacuation; in the soft tissues of thigh fine/small metallic fragments and bone sequestrations.

22/II 1944 casualty fell and destroyed consolidation. Was superimposed gypsum splint.

9/III splint is taken/removed. Wounds cicatrized. Movements in the knee joint are sharply restricted. In the scar from the face is opened the fistula with moderate suppurative discharge. In the X-ray photograph of 12/III is discovered the consolidated break of thigh with the phenomena of chronic osteomyelitis and the presence of large/coarse bone sequestrations.

6/IV Patient was represented to the commission apropos of the incorrectly grown together break of left thigh with the shortening of thigh on 7 cm, the immobility of knee joint; there is a fistula in the region of scar on the medial surface of thigh.

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Table 178. Results of the research of the blood in wounded K. I. D.

(1) Дата	(2) Гемо- гло- бин в %	(3) Эритро- циты	(4) Цветный показатель	(5) Леммо- циты	(6) Юные
31/VIII 1943 г.	30	3 350 000	0,75	5 600	0
12/IX •	43	2 580 000	0,86	9 500	0
17/IX •	48	3 050 000	0,80	6 500	0
23/IX •	22	1 650 000	0,68	9 800	0
4/X •	47	2 600 000	0,90	6 000	0
26 X •	52	3 690 000	0,86	13 800	0
17 X I •	60	3 540 000	0,88	5 300	0
1 X II •	65	—	—	7 800	0
18/X II •	70	—	—	4 500	0
24/III 1944 г.	75	—	—	5 200	0

(7) Па- лоч- ко- нвер- ные	(8) Сег- мен- то- ядер- ные	(9) Общее количе- ство ней- трофилов	(10) Лим- фо- циты	(11) Мо- ноци- ты	(12) Эози- нофи- лы	(13) Базо- филы	(14) РОЭ в час в мм	(15) Ядер- ный индекс	
(16) (в процентах)									
5	53	58	28	10	4	0	41	—	
5	64	69	25	2	4	0	60	0,08	(18) Анизокитоз
6	62	68	22	9	1	0	60	0,09	(18) Анизокитоз
10	70	80	12,5	6	1,5	0	77	0,05	(19) Анизокитоз, поли- хромазия
11	62	73	18	7	2	0	51	0,15	(20) Анизокитоз, поли- хромазия, тени
11,5	68	79,5	14	6	0,5	0	44	0,15	(21) Гумпрехта, токсиче- ская зерни- стость нейтро- филов
5	70	75	19	3	3	0	28	0,07	
2	64	66	27	4	3	0	28	0,03	
2	57	59	35	1	5	0	20	0,04	
2	64	66	29	4	1	0	5	0,03	

Key: (1). Date. (2). Hemoglobin in o/o. (3). Erythrocytes. (4). Colored indicator. (5). Leukocytes. (6). Young. (7). Stabnuclear. (8). Segmentonuclear. (9). Total quantity of neutrophils. (10). Lymphocytes. (11). Monocytes. (12). Eosinophils. (13). Basophils. (14). ROE in hour in mm. (15). Nuclear index. (16). (in percentages). (17). g. (18). Anisocytosis. (19). Anisocytosis, polychromation. (20). Anisocytosis, polychromatia, (21). Gumprecht's shadow, toxic graining of neutrophils.

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In the analyses of the urine of no deflections from the norm it was. Table 178 gives the results of the research of the blood wounded K. I. D.

The given example is characteristic fact that all means of medical aid to casualty were shown/rendered in proper time. 8 Hours after wound is poured the blood and antishock fluid/liquid and is produced the being all-inclusive primary surgical processing. 3 Days after wound is superimposed therapeutic immobilization in the form of deaf gypsum bandage. To casualty systematically were produced all clinical and laboratory investigations and twice repeatedly was subjected to operation/process for the removal/distance of bone fragments. In spite of this, in casualty nevertheless developed the phenomena of osteomyelitis, contracture and the shortening of extremity. Only by the severity of wound it was possible to explain so heavy clinical a course, and a comparatively favorable clinical outcome was the result of in proper time produced surgical interventions and extensive complex of the measures, directed toward an increase in the general/complex/total resistivity of the organism of casualty. This outcome should be counted for the casualty sufficiently to good ones, since, in spite of serious wound and complications, he succeeded in maintaining life, and extremity.

The distribution of the principal forms/species of complications on the years of war is given in Table 179.

As can be seen from represented data, the frequency of shock with the bullet breaks of thigh continuously increased from year to year, after achieving maximum toward the end of the war when the complication of shock was observed in comparison with the first year of war in four times more frequent. This can be explained, first of all, by the fact that with gradual putting into practice of work DMP and KhPPG of the systematic utilization of apparatuses for measuring the blood pressure the quality of the diagnosis of shock during the entire war continuously was improved. Thus, a number of revealed complicated by shock bullet breaks of thigh was increased due to the identification of more than the lungs of its forms. In this case it is necessary to have in mind that the frequency of the complication of shock is always explained by the conditions of the combat situation which, it is doubtless, were different for each year of war individually. In particular, the significant frequency increase of shock in 1945 in comparison with 1944 can be explained by the fact that the combat operations/processes of 1945 related to the winter-spring period.

Table 179. Frequency of the most important complications of the bullet breaks of thigh on the years of war (in the percentages).

(1) Год войны (календарный)	(2) Осложнения			
	(3) Шок	(4) Анаэроб- ная ин- фекция	(5) Сепсис	(6) Остеоми- елит
1941	3,1	12,7	6,7	24,7
1942	4,6	11,0	9,3	31,1
1943	7,1	12,1	10,6	31,6
1944	10,6	13,2	8,3	31,8
1945	12,5	12,0	11,5	32,6

Key: (1). Year of war (calendar). (2). Complications. (3). shock.
(4). anaerobic infection. (5). sepsis. (6). osteomyelitis.

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The frequency of the complications of osteomyelitis on the years of war oscillated very insignificantly, with exception of the first year of the war when the complications of osteomyelitis were observed considerably less frequent, which, probably, was caused by that determined in that period the stability of the contingent of casualties according to the age when a quantity of persons is younger than 20 and older than 40 years were minimum. a number of complications of anaerobic infection on the years of the war of any significant oscillations/vibrations did not present.

Furthermore, during the explanation of the reasons for that

observing on the whole of certain build-up/growth of the percentage of severe complications with the bullet breaks of thigh on the years of war it is necessary first of all to have in mind an increase in the number of fragmentation wounds with the bullet break of thigh, and also an increase in the number of associated multiple wounds, crushed breaks and wounds with the foreign bodies.

In conclusion it is necessary to explain a number of cases in which during the treatment of the bullet breaks of thigh in the Great Patriotic War occurred the completely smooth clinical course, which ended by full/total/complete recovery.

Based on materials of deepened development of the histories of disease/illness, a number of cases of the bullet breaks of the thighs which were not escorted/tracked by the associated wounds, the damage of vessels and nerves, by the wound, which required amputation, and any complication, which destroyed in one or the other stage favorable clinical course, was small. They composed altogether only 4.10/o (from a total number of bullet breaks of thigh). The relative number of cases by this favorable clinical course remained during the entire war almost stable and gave on the years of the war of the very insignificant oscillations/vibrations: in 1941 - 3.90/o, in 1942 - 3.40/o, in 1943 - 5.20/o, in 1944 - 3.80/o, in 1945 - 4.60/o.

Smooth clinical course not not equally frequently was not observed with different type breaks. Thus, with the perforated and the edge/boundary it was observed into 12.30/o, with the large-splintered - into 3.00/o, with the cross, the longitudinal and the oblique - into 2.80/o, with that crushed and small-splintered - into 1.80/o.

Thus, with the perforated and edge/boundary breaks smooth clinical course was observed 4-7 times more frequently than with other forms/species of break, and with the large-splintered ones - almost two times more frequently than with the small-splintered ones and crushed. Favorable clinical course therefore was found in the definite dependence on the form/species of the break: is the less complex was complex the break, the more frequent it was escorted/tracked by smooth clinical course and vice versa.

Smooth clinical course attacked/advanced with the bullet wounds two times more frequent (5.00/o) than with fragmentation wounds (2.50/o).

Thus, the analysis of represented data shows that the smooth clinical course most frequently attacked/advanced with the edge/boundary and perforated breaks of thigh after bullet perforating wounds.

Smooth clinical course occurred $2\frac{1}{2}$ times more frequently in those more mild cases of the break of the thigh when there are no readings/indications to the primary surgical processing (in those processed smooth course is noted into 3.0o/o, and in those not treated - into 7.5o/o).

Smooth clinical course was observed more frequently in such cases of the break of thigh, with which primary surgical processing was performed during first days after wound (3.5o/o) and less frequent (2.5o/o) after surgical processing during the second day.

Favorable clinical course more frequently was observed when as a result of character/nature and form/species of break was used the simplest method of surgical processing.

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Thus, smooth clinical course was observed after splitting up into 4.0o/o, after carving - into 2.4o/o, after the removal/distance of foreign bodies - into 3.0o/o and after the removal/distance of bone fragments - in 2.3o/o case.

The periods of the stay of casualties with the bullet break of thigh undergoing medical treatment in the hospitals of different stages in the cases with the favorable clinical course were almost two times shorter (on the average of 3.4 months), than in the cases, which flowed/occurred/lasted with the complications. The treatment of the favorably flowed/occurred/lasted breaks led to the following final outcomes: a good functional and anatomical result - 80.0o/o, strain on the spot of break - 6.7o/o, contracture, the limitation of mobility - 8.3o/o, other and are unknown - 5.0o/o.

Treatment of the bullet breaks of thigh.

Honored Scientist professor is Colonel MC Ye. L. Berezov docent N. V. Kravchenko.

One of the largest achievements of military field surgery is the proposed by N. I. Pirogov gypsum bandage for the treatment of bullet breaks. N. I. Pirogov's "Adhesive alabaster bandage" (1845) in essence was that bandage by which it was judged play the leading role during the treatment of the bullet breaks in all subsequent wars and especially in the Great Patriotic War. The value of gypsum bandage consists not only in the fact that she provides the excellent fixation of the break, but also in the fact that it is simultaneously the best substance, which creates rest to the infected wound, and consequently, serves as the best method of struggle with the suppurative infection.

Gypsum bandage in the original form/species, as it were used in the previous wars, had a number of essential deficiencies. Since gypsum bandage itself could not solve the complex problem of the treatment of bullet breaks with all their complications, was developed the whole system of the treatment of bullet breaks, in

which gypsum bandage engaged essential place.

During the Great Patriotic War during treatment of one and the same casualty, depending on medical readings/indications and circumstances, it was used both the gypsum bandage and skeletal/skeleton traction/extension as basic measure. Simultaneously with these manipulations was used surgical intervention, sometimes it is repeated.

Gypsum technology itself underwent substantial changes. Gypsum bandage in the Great Patriotic War was used the mainly afterward radical specialized surgical processing of the wound of soft tissues and bone. It were laid not simply not by hand, but using apparatuses for the traction/extension and orthopedic tables, besides in the majority of the cases without any wadded gasket.

Based on materials of the deepened development it is explained that the gypsum bandage was laid on the wound with the wadded gasket into 14.20/o; without the gasket - into 26.00/o; it is not indicated as - into 59.80/o. Thus, if all cases in which there are no indications of the presence of gasket, to relate to the cases without the gasket, then it will nevertheless seem that the gasket was applied into 14.20/o. All these cases relate to the first years of war.

Deficiencies in the gypsum bandage, which was being used in the previous wars, depended not only on the fact that it were laid with the wadded gasket, but also from the fact that the gypsum technology did not stand then at the proper height, and bandage was laid on the badly/poorly processed or in no way processed wound.

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The primary surgical processing of wounds, setting of the broken ends of bone with the aid of the apparatuses for the traction/extension, with the subsequent application of lined deaf gypsum dressing, use/application of therapeutic gymnastics and early walking of patients in the gypsum bandage with the support to the damaged extremity to a considerable extent removed its deficiencies.

The wounds of wartime in contrast to the wounds of peacetime are treated according to the principle of stage treatment; therefore deaf gypsum bandage in the foremost stages of evacuation had the significant advantages before other forms/species of the immobilization of the bullet breaks of high.

Gypsum bandage gave the possibility to conduct the treatment of

the breaks of thigh in the advantageous for the casualty position/situation during the prolonged period of his evacuation from the front into the internal areas of the country.

Rare dressings, convenience in the transport, good general/common/total health of casualties in the deaf gypsum bandage because of the faultless immobilization of extremity made it possible to consider this method one of the largest achievements of surgery in the region of the stage treatment of the bullet breaks.

By this is explained the fact that in the Great Patriotic War the use/application with the bullet breaks of the thigh of deaf gypsum bandage completely deservedly engaged the leading place, and, based on materials of the deepened development of the histories of disease/illness, it was superimposed by 61.70/o of casualties with the bullet break of thigh.

When this was required from the medical readings/indications, gypsum bandage removed/tack on one of the intermediate stages evacuations, performed additional repeated operations/processes, and then to casualty either again laid gypsum bandage, or temporarily was laid skeletal/skeleton traction/extension in order after the elimination of complications to again change for the immobilization by gypsum bandage.

In the hospitals of the deep rear where greater partly was finished the treatment of casualties with the break of thigh, also were used gypsum bandages, and skeletal/skeleton traction/extension in the dependence on the medical readings/indications.

Positive experience during the treatment of the bullet breaks of thigh by the combined method, obtained during the war with White Finns (1939), made it possible to widely apply this method in the great Patriotic war in the rear hospitals.

For this clinico-static analysis are used not only the materials of the deepened and author's development of the histories of disease/illness, but also the materials of the personal observation, which consist of 1 515 histories of the disease/illness of casualties with the bullet break of thigh, that were being located undergoing medical treatment in the large/coarse rear hospital.

As the basis of the analysis of the methods of treatment and outcomes with the bullet breaks of thigh are accepted the statistical data of the deepened development of the histories of the disease/illness of the military medical museum the armed forces of the USSR for two large groups of casualties with the bullet break of

thigh, that finished the treatment: 1) in the therapeutic installations for front rear, including the latter, and 2) in the hospitals of the deep rear.

Into the first group entered the casualties, who obtained the lightest bullet incomplete breaks of the thighs (perforated and edge/boundary), which ended by recovery in the hospitals of army and front rear; into the same group of casualties entered the dead persons and casualties, who were subjected to amputation in the limits of army and front line therapeutic installations. Into the second group entered the remaining casualties who were evacuated into the deep rear and they there finished their treatment.

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The material of the personal observation of the authors most of all approaches the second group, since it in essence relates to the hospital of the deep rear.

Table 180 illustrates the distribution of all wounded three groups according to the means of wound, while Table 181 - according to the form/species of break.

Hence it is apparent that in the first group among the

casualties, who finished treatment in the limits of front line installations, the fragmentation wounds predominated above the bullet ones. The sufficiently visible place in it occupied chalk and large-splintered and crushed breaks (table 181).

In the second group among the casualties, who finished treatment in the deep rear, bullet wounds predominated above the fragmentation ones, and among the breaks occupied the first place the large/coarse and small-splintered, whereas crushed breaks of thigh they possessed the smallest specific gravity/weight.

Based on materials of personal observation, the preponderance of bullet wounds of fragmentation ones is expressed still more significant. However, relationship/ratio of the breaks approximately the same as in the second group.

The comparison of two groups indicated shows that in the hospitals of front rear finished treatment the casualties both with most the lungs and with the heaviest breaks of thigh.

Table 180. Distribution of casualties in the studied groups according to the means of wound (in the percentages).

(1) Группа раненых	(2) Ранение	
	(3) пулевое	(4) осколоч- ное
(5) Первая	43,9	56,1
(6) Вторая	58,7	41,3
(7) Личные наблюдения авторов	65,1	34,9

Key: (1). Group of casualties. (2). Wound. (3). bullet. (4). fragmentation. (5). The first. (6). The second. (7). Personal observations of authors.

Table 181. Distribution of casualties in the studied groups according to the form/species of break (in the percentages).

(1) Вид перелома	(2) Группа раненых		
	(3) первая	(4) вторая	(5) личное наблю- дение авторов
(6) Дырчатый и краевой	23,5	19,1	19,7
(7) Продольный, поперечный и косой	11,9	24,0	22,2
(8) Раздробленный	29,6	12,1	14,5
(9) Мелко- и крупнооскольчатый и вколоченный	35,0	44,8	43,6
(10) Итого	100,0	100,0	100,0

Key: (1). Form/species of break. (2). Group of casualties. (3). the first. (4). the second. (5). personal observations of authors. (6). Perforated and edge/boundary. (7). Longitudinal, cross and by sand bar. (8). Crushed. (9). Chalk and large-splintered and packed in. (10). Altogether.

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However, in the hospitals of the rear finished treatment heavier casualties from a number of those obtained perforated or edge/boundary break and were the lungs casualties, from a number having received the crushed large/coarse and small-splintered break, and also occupied the middle place between them on the severity wounds with the longitudinal, oblique and cross break.

The position/situation indicated remains valid and for the casualties with multiple wounds, whose bullet break of thigh was matched with the wounds of other regions. Thus, for instance, penetrating wounds of different regions, and also breaks of other bones (except thigh), which could substantially influence the outcome of the bullet break of thigh, were encountered in the mentioned above groups in the following relationships/ratios (Table 182).

The associated wounds only of soft tissues in the first group were observed into 78.4% of cases, and in the second group - into 83.10%. Hence it is apparent that the associated wounds, capable of influencing the outcome of the bullet breaks of thigh, i.e., the wound of skull, breast, stomach, pelvis and the associated breaks of

the bones of extremities, were encountered more frequently in the first group of the casualties, who finished treatment in the front rear.

The associated wounds were absent from the first group of casualties into 58.70/o of cases, and in the second group - into 69.20/o, which also characterizes the second group as that less aggravated.

The information about the periods of the entry of casualties into the rear evacuation hospital, based on materials of the personal observations of the authors, was following: from 10 to 20 days after wound - 18.60/o, from 21 to 30 days - 17.70/o, from 31 to 40 days - 12.10/o, from 41 to 50 days - 13.00/o, from 51 to 60 days - 8.90/o, from 61 to 70 days - 11.10/o, 71 day later - 18.60/o. The entry of the significant part of the casualties during the first 40 days from the moment/torque of wound relates to phase of combat in the environs of Moscow and Stalingrad when into the rear hospital casualties were delivered within the earlier periods than in other periods of war.

The absolute majority of casualties (89.10/o) arrived into the rear hospital in the deaf gypsum bandage, with exception of the small unit of entered in the gypsum casts and transport splints (10.90/o).

Wounded first groups, i.e., finished treatment in the front rear, passed on the average of every 2.9 stages, while wounded second groups, i.e., those finished treatment in the deep rear, passed on the average of every 5.6 stages.

For the more accurate characteristic of the contingents of the casualties, who finished treatment in the front line and deep rear, it is necessary to note that the large part of them underwent primary surgical processing during the first day and was obtained the specialized aid during the first 6 days. 26.8c/o of casualties with the bullet break thighs from the first group and 23.9o/o of casualties from the second group did not undergo, the primary surgical processing of wounds.

Table 182. Character/nature of the associated wounds the casualties have with the break of the thigh of the studied groups (in the percentages).

Группа раненых	Проникающие ранения				Сопутствующие переломы костей			Ранение только мягких тканей	Всего
	черепно-лицевые	грудь	живота	таза	верхней конечности	нижней конечности	итого		
Первая	1.4	1.4	1.0	1.4	7.7	9.7	21.6	78.4	100.0
Вторая	0.5	0.9	0.1	0.7	7.4	7.3	16.9	83.1	100.0

Key: (1). Group of casualties. (2). Penetrating wounds. (3). Associated breaks of bones. (4). Wound only of soft tissues. (5). skull, person, neck. (6). breast. (7). stomach. (8). pelvis. (9). upper extremity. (10). lower extremity. (11). altogether. (12). In all. (13). The first. (14). The second.

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The first group of casualties with the the bullet fracture of thigh after primary processing underwent repeated operations/processes in the army area into 34.80/o of cases and in the front line area - into 45.2c/c of cases.

The second group of casualties with the bullet break of thigh after primary processing underwent repeated operations/processes in the army area into 20.5c/c of cases, in the front line - into 21.00/o and in the rear - into 42.50/o of cases. Thus, from the preceding information it is evident that the wounded first groups much more frequently underwent surgical interventions than the wounded second groups which, in view of the more favorable course of the break in the period of treatment in the army and front line area, more frequently were directed without the operations/processes for the rear evacuation hospitals. A number of different operations/processes in both groups was differently (Table 183).

Thus, in the first group of casualties among the

operations/processes, produced in the army and front line area, predominated amputations (35.7o/o), autopsy of flows and phlegmons (20.8o/o) and examination of wounds (11.6o/o), being approximately all 2/3 surgical interventions. Sequestrectomy in this group of casualties it had very light specific gravity/weight - 7.8o/o of all operations/processes. Of this type operational aid corresponded to the heaviest contingent of casualties with the bullet break of thigh, held up in the front line area for dealing with the developing complications.

However, in the casualties of the second group, who finished treatment in the deep rear, the greatest specific gravity/weight it had sequestrectomy (29.1o/o), in the second place stand amputations (14.7o/o), which were produced mainly apropos of the complications of sepsis, by anaerobic infection and by osteomyelitis. Remaining operations/processes - removal/distance of foreign bodies (12.5o/o), autopsy of suppurative flows and phlegmons (10.4o/o), examination of wounds (7.7o/o) and processing the fragments of bone (4.5o/o) - also most frequently were produced for dealing with the suppurative processes in the wound, for accelerating the healing of wounds.

From the operated casualties with the bullet break of thigh in the first group to each casualty it fell on 1.4 operations/processes, and in the second group - on 2.6 operations/processes.

According to the data of personal observations, the breaks of thigh, with which were necessary repeated surgical interventions during the treatment in rear evacuation hospitals, composed 69.90/o, including into 21.40/o of cases was produced late wide reworking.

The data about the used immobilization of extremity in casualties with the bullet break of thigh both undergoing the repeated operations/processes and not undergoing operations during entire treatment, are represented in Table 184.

Table 183. Distribution of the operations/processes (besides primary processing), produced in the army and front line area by casualty with the bullet break of thigh, which finished treatment in the front rear (first group) and which finished him in the deep rear (second group) (in the percentages).

(1) Группа раненых	(2) Ревизи- он раны	(3) Удале- ние ин- ородных тел	(4) Обра- ботка фраг- ментов кости	(5) Вскрытие гнояных лазиков и флег- мон	(6) Пере- вязка госу- дов	(7) Ам- пута- ция	(8) Реам- пута- ция	(9) Сек- вестр- эктомия	(10) Про- чие	(11) Всего
(12) Первая . .	11.6	7.1	4.9	20.8	4.2	35.7	0.7	7.8	7.2	100.0
(13) Вторая . .	7.7	12.5	4.5	10.4	1.0	14.7	6.0	29.1	14.1	100.0

Key: (1). Group of casualties. (2). Examination of wound. (3). Removal/distance of foreign bodies. (4). Processing fragments of bone. (5). Autopsy of suppurative flows and phlegmons. (6). Dressing of vessels. (7). Amputation. (8). re-amputation. (9). sequestrectomy. (10). Other. (11). In all. (12). The first. (13). The second.

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From represented data it is evident that in the first group of casualties with the bullet break of thigh, that finished treatment in the front line area, prevailed the immobilization of breaks by splints (54.70%), which is explained by the appropriate character/nature of breaks and by the presence of the complications,

which required constant observation and repeated surgical interventions. Immobilization by splints was produced with the incomplete breaks (perforated and edge/boundary), and also with those complicated by sepsis or by anaerobic infection the heavy breaks many of which ended by amputation. Skeletal/skeleton traction/extension, frequently in the combination with the subsequent or preceding application of gypsum dressing, was used in 6.20/o of casualties with the bullet break of thigh from a number, that finished treatment in the front rear.

Completely different relationships/ratios of the methods of the immobilization of the bullet breaks of thigh were observed in casualties, who finished treatment in the rear. Gypsum bandage as the only form/species of immobilization was used in 67.8c/o of casualties. Here entered the majority of casualties with the smoothly flowed/occurred/lasted break of the thighs which did not undergo repeated operation/process in the rear; they composed 57.50/o of total quantity of those finished treatment in the rear. Gypsum or other splint was applied into 15.60/o of breaks of thigh, namely with the incomplete breaks of thigh (perforated and edge/boundary). To the sufficiently significant group of casualties with the bullet break thighs in the rear hospitals used skeletal/skeleton traction/extension (14.7c/o).

The treatment of the bullet breaks of thigh in the deaf gypsum bandage in the rear evacuation hospital required thorough observation of the general condition of casualty, after the picture of the blood and the temperature curve, since only on these symptoms it was possible with by the closed gypsum bandage to wound to in proper time diagnose suppurative flow. Exception were sharply exhausted casualties whose education of flows quite often was not escorted/tracked by noticeable temperature variations or they were extremely insignificant. In these cases the sharp incidence/drop in the quantity of erythrocytes and percentage of hemoglobin, the shift/shear of leukocyte formula to the left, lymphopenia, a descent in the quantity of monocytes testified about the education of flows. The development of suppurative flows was always the indicator of the march/passage of process into the heavier form. Based on materials of the own observation of the authors, 7.00/o of all casualties with the bullet break of thigh it was necessary to operate apropos of flows and phlegmons.

After the removal/taking of deaf gypsum bandage produced expansion the wounds, removed the become numb, and sometimes casualty by osteomyelitis bone broken ends, laid contra-apertures.

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Table 184. Character/nature of the therapeutic immobilization, which was being used the casualties have with the bullet break of thigh, terminating treatment in the front line area (first group) and in the deep rear (second group) (in the percentages).

(1) Группа раненых	(2) Вид иммобилизации					(7a) Всего
	(3) гипсован или другая шина	(4) все виды глух. и гипсовой повязки	(5) скелетное вытяжение	(6) скелетное вытяжение в гипсовой повязке	(7) прочие виды фиксации	
(8) Первая	54,7	34,0	1,4	4,8	5,1	100,0
(9) Вторая	15,6	67,8	0,7	14,0	1,9	100,0

Key: (1). Group of casualties. (2). Form/species of immobilization. (3). it is plastered or another splint. (4). all forms/species of deaf gypsum bandage. (5). skeletal/skeleton traction/extension. (6). skeletal/skeleton traction/extension and gypsum bandage. (7). other forms/species of fixation. (7a). In all. (8). The first. (9). The second.

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Suppurative wound was abundantly washed in physiological solution and they again laid deaf gypsum bandage. All this contributed to a significant improvement in the general condition of casualty.

It is very important to note that the autopsy of flows and the

removal/distance of fine/small broken ends the bones did not always provide sufficient drain from the wound. It was necessary to open even marrow canal to the healthy/sound sectors of the broken ends of thigh, with great care relating in this case to periosteum. This helped to localize osteomyelitic process and to successfully carry on a struggle with the suppurative infection. After the later entry of casualties already with the coalesced break the autopsy of flows was produced simultaneously with the cautious early sequestrectomy. These cases have related we to operations/processes apropos of osteomyelitis. According to the personal observations of the authors, a comparatively small unit of the casualties entered rear hospital without the X-ray photographs or with the photographs, produced to the application of deaf gypsum dressing. However, the first X-ray test of the correct standing of bone broken ends for the most part it was necessary to produce in the rear hospital.

The disseminated before the war view, that the bullet breaks, in contrast to those closed, little are inclined to the displacement as a result of the significant damage of muscles and crushing of bone, did not justify on the experiment/experience of the Great Patriotic War. The bullet breaks of thigh were also escorted/tracked by the displacement of broken ends, sometimes by sufficiently significant, in particular if in the foremost stages was not produced the early reposition of broken ends and the reliable fixation of extremity by

deaf gypsum bandage. If reposition was not produced in the preceding stages, then it was necessary to produce within the later periods and rear hospital, which, according to the data of personal observations, occurred into 6.5c/c of all breaks. Here did not enter those casualties, who entered rear hospital in the transport splints, and by it with processing of wound was simultaneously produced one-time setting of break on the apparatus for the traction/extension. In 2.60/o of casualties with the bullet break of the thighs which arrived with the marked callus and the sharply pronounced deformation, was used bloody reposition and skeletal/skeleton traction/extension with the subsequent deaf gypsum bandage.

Of 40 bloody refractures in 2 cases the result was unfavorable: to one casualty in connection with the infectious suppurative complication of septic character/nature was produced the amputation of thigh, and in another was formed dummy joint, apropos of what it was necessary to produce osteoplastic operation/process. If with the not-grown-together breaks of thigh the standing of broken ends was clearly unsatisfactory and due to the late periods could not be produced the one-time reposition of broken ends on the apparatus for the traction/extension, then casualties they translated to the treatment by skeletal/skeleton traction/extension. According to the data of personal observations, by skeletal/skeleton

traction/extension it was treated by 8.40/o of casualties.

By the example to this late reposition of broken ends as skeletal/skeleton traction/extension can serve the following observation.

P., 23 years, is wounded 20/VIII 1941 5 hours. In the card of forward area on PMP is set the diagnosis: the bullet break of right thigh. On PMP was superimposed the tourniquet. On DMP during the same day it is written: the bleeding vessels are ligated, hemorrhage from the fine/small vessels is stopped by tamponade. Is superimposed Thomas's splint. Casualty is evacuated to the evacuation point, where he arrived 21/VIII 1941. After dressing the casualty 23/VIII was evacuated in KhPPG, where with the dressing was discovered in lower third of right thigh from the face circular point wound, and from inside - torn wound by value with the palm. The unit of the wound is covered with the raid of sanicus color. From the wound was removed tampon.

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Within a week was observed an increase in the temperature to 38° in the evenings. To casualty was introduced antitetanus serum; on the dressings was noted much pus; wound began to be covered/coated with

granulation. Was laid bandage with chloramine and Rivanol and was produced immobilization by Thomas's splint.

2/IX casualty was evacuated into evacuation hospital where during the same day was superimposed gypsum bandage with the window. In the hospital it was located 2/IX through 9/IX. Always kept subfebrile temperature. On 9/IX in the satisfactory condition was evacuated in the rear. 11/IX it arrived in the rear evacuation hospital. It was here noted, that the casualty is in a good state, no deflections from the norm from the side of internal organs/controls it is found. Through the window in the gypsum bandage is made the dressing. On the internal surface of thigh a deep wound by the size/dimension 15x8 cm is upset, contaminated; abundant suppurative separated with the strong malodorous odor. Is superimposed bandage with the hypertonic solution.

12/IX in the X-ray photograph is discovered a comminuted fracture in lower third of right thigh. Broken ends will stand at angle to each other; bearing angle is opened towards the inside.

12/IX gypsum bandage is taken/removed and is superimposed skeletal/skeleton traction/extension. The first 2 days temperature was raised to 37.4°, and then it was normal. 15/IX appeared pains in by law/right shoulder joint and sharp pain during the urination.

In the urine (from 13/IX) is found: the protein 0.06o/oc, epithelium flat/plane in large quantities, leukocytes cover/ccat entire field of view. 24/IX casualty produced complaints on the pain in the region of wound and reduction in the appetite; the temperature normal. 26/IX in the region of inlet was opened/discovered fistula with abundant suppurative discharge.

2/X 1941 in casualty after a chill appeared severe pains into the region of wound, the liquid chair/stool; next day - headache, overall weakness. Temperature was increased to 40° and kept to 17/X with the oscillations/vibrations to 38°.

4/X in casualty was discovered flow on an outward-posterior surface of thigh down from the fistula; in view of the failure of casualty initially of the section/cut the flow was opened only 6/X.

11/X, as a result of the severe pains in the wound and into the region of the former section/cut, and also of the significant overall weakness of casualty, the skeletal/skeleton traction/extension taken/removed is produced immobilization by wire splints. Temperature remained increased to 30/X; from the wound was secreted an abundant quantity of pus, periodically were observed diarrheas on 3-4 times a

day. In the region of the ankles/malleoli and right talocrural joint was noted the swelling of skin and subcutaneous cellular tissue.

3/XI - temperature within the limits of the norm, the condition of casualty considerably was improved, sleep and appetite became normal. To casualty was superimposed deaf gypsum bandage with the window. 4/XI gypsum bandage dried, and casualty began to walk with the aid of the crutches.

24/XI gypsum bandage is taken/removed. In the X-ray photograph is noted a good bone corn in the region of the break of thigh with the satisfactory standing of bicker ends.

In the knee joint is observed full/total/complete straightening, and flexing to 160°. Is assigned therapeutic gymnastics for an increase of the volume of movements in the joint.

16/XII it is directed toward the commission with the diagnosis: not-grown-together scars after the wound of right thigh, the well expressed callus, the shortening of thigh on 1.5 cm, the limitation of flexing in the elbow to the bearing/angle in 140°.

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The analysis of the blood.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Дата	Эритроциты	Гемоглобин в %	Цветной показатель	Лейкоциты	Эозинофилы	Юные	Лимфоциты	Мелкозернистые	Лимфоциты	Моноциты	Скорость оседания эритроцитов
					(13)	в процентах					
22 IX	4 370 000	59	0,7	—	1,5	—	6	93	21	4,5	56
3/X	3 680 000	57	0,7	9240	—	—	6,5	75	15	3,5	33

Seedings/inoculations of the blood: 8/X - growth of *Staphylococcus aureus*. 20/X and 25/X - seeding/inoculation growth did not give.

Seedings/inoculations of pus: 17/IX from the seeding/inoculation is isolated *Proteus vulgaris*. 2/X - increase in the unitary colonies of *Staphylococcus aureus* and diphtheria bacillus/rod.

Key: (1). Date. (2). Erythrocytes. (3). Hemoglobin in o/o. (4). Color indicator. (5). Leukocytes. (6). Eosinophils. (7). Young. (8). Rod-shaped. (9). Segmented. (10). Lymphocytes. (11). Monocytes. (12). ROE in hour in mm. (13). (in percentages).

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Thus, in this case to casualty was used, depending on medical readings/indications and conditions of the combat and medical situation, transport immobilization by splint Thomas - Vinogradov,

therapeutic immobilization by gypsum bandage during the evacuation, then skeletal/skeleton traction/extension in the rear evacuation hospital and again gypsum bandage for the walking. Casualty transferred complication in the form of hemorrhage, sepsis and nevertheless, because of the use/application of complex, including functional treatment, they were obtained more than satisfactory results.

During the treatment of the bullet breaks of thigh skeletal/skeleton traction/extension with the subsequent leaf gypsum bandage obtained on the whole good results. Simultaneously it was necessary, however, to be convinced of the fact that the skeletal/skeleton traction/extension was admissibly only on avoiding of the sharp, acute phase of infection. Thus, for instance, in one case as a result of the imposition of skeletal/skeleton traction/extension sharply sharpened pyoinflammatory process in the soft tissues, which made it necessary to put leaf gypsum bandage. In other analogous case forced were to produce amputation the thighs.

If casualties entered a good condition, with the correct standing of broken ends and a good immobilization of extremity, then gypsum bandage did not change during 1 1/2 or 2 months.

Based on materials of the personal observation of the authors,

24.10/o of casualties on the arrival into the hospital were necessary to change gypsum bandages as a result of the breakage or softenings by their abundantly ensuing/escaping/flowing cut pus, and also when the additional fixation of healthy extremity is present . These bandages with the additional fixation of healthy/sound extremity, successfully which were being used under conditions of front for the prolonged evacuation, prevented functional treatment under conditions of rear hospital and therefore they were replaced by ordinary deaf gypsum bandage with the corset to the level it was mammillary.

According to the data of the deepened development of the histories of disease/illness, gypsum bandage in finished treatment in the rear evacuation hospitals casualties with the bullet break of thigh into 41.80/o of cases was changed not to time, in 27.60/o it was changed one time, into 12.50/o it was changed twice, 4.90/o - three times, 2.50/o - four times, into 8.60/o of cases was conducted the treatment in the gypsum splint and into 2.10/o - in the gypsum fenestrated bandage.

The most important tasks of the treatment of the bullet breaks of thigh under conditions of rear evacuation hospital was the provision of a correct standing of broken ends, successful struggle with the infection, is now and then which stormily flowed/occurred/lasted with the heavy general condition, and

achievement of a good functional outcome.

The shift/relief of large gypsum bandage with the break of thigh - procedure for the casualty is difficult. However, in hospital practice there is sufficiently examples when only from the removal/taking of entire bandage it was possible to reveal/detect the place of the accumulation of pus, besides frequently not in the region of wound, but it is above or lower than it.

Therefore the examination of the wound through the cut out in the gypsum bandage window was used rarely, since this did not provide the possibility of thorough, comprehensive examination/inspection. By this is explained, based on materials of personal observation, the insignificant specific gravity/weight of the casualties (16.20/o), treated in the rear hospitals without the shift/relief of gypsum bandage. On the removal/taking of bandage the inspection/examination was produced on the apparatus for the traction/extension under conditions, which allowed/assumed the convenient examination/inspection of extremity.

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Upon the thorough inspection/examination of wound and its periphery it was possible to determine, there is flow, infiltrate,

thrombophlebitis or a lymphadenitis. Having been only convinced of the fact that flows and there are no infiltrates, that the drain from the wound occurs without the delay, and the broken ends of bone stand correctly, they began the application of deaf gypsum dressing.

The inspection/examination of wound and the application of gypsum dressing were produced under the anesthetization by morphine according to this plan/layout: before the quarters/premises to the apparatus for the traction/extension or the orthopedic table to patient was introduced intravenously 1 ml 10/c morphine, also, after 5-10 minutes repeatedly the same dose. This in the significant majority of the cases it was completely sufficient for the painless shift/relief of bandage and inspection/examination of wound.

In the cases of reworking either autopsy of flows they preferred to use cerebrospinal anesthesia, preliminarily introducing subcutaneously epinephrine, or ether anesthesia.

Before the operation/process were produced the X-ray photographs in two projections after the removal/taking of gypsum, which gave the possibility to be oriented in the essence of pathological changes in the region of break.

After the sufficiently wide autopsy of the deeply

arranged/located suppurative focus removed the nonvital tissues, free bone broken ends, bit the involved in the osteomyelitic process ends of the bone broken ends and were removed foreign bodies.

Operation/process was finished with the washing of wound with physiological solution and with dusting by sulfanilamides.

Tampons and drainage, as a rule, in the wound did not insert. After this processing and reposition of break on the apparatus for the traction/extension was laid deaf gypsum bandage.

After reworking in many casualties, even who entered in the condition of severe intoxication with the high temperature, was improved the general condition and faded suppurative infection. To success contributed reliable immobilization, prolonged rest of wound in the deaf gypsum bandage, and also repeated blood transfusions and sulfanilamide therapy.

If temperature descended, hemoglobin and leukocytosis came to the norm, then to casualty as soon as it was in the forces, they permitted walking in the gypsum bandage with the support to the wounded extremity and appointed therapeutic gymnastics.

On the removal/taking of gypsum bandage in time which depended on the consolidation of break, extensively was used physiotherapy,

peat and paraffin/kerosene application and massage.

In all casualties with the bullet break of thigh, who finished treatment in the front rear (first group) and in the deep rear (second group), within always of their treatment were noted the following principal complications (Table 185): in the group of casualties with the bullet break of thigh, that finished treatment in the front rear, greatest specific gravity/weight among the complications had anaerobic infection, shock and sepsis; in the group of casualties with the bullet break of thigh, that finished treatment in the deep rear, greatest specific gravity/weight had the complications of osteomyelitis and by abundant festering in the wound, whereas the complications of anaerobic infection and of sepsis fell back to the second plan/layout.

It is necessary to note that for prophylaxis of sepsis had high value repeated surgical interventions, produced in the rear with the bullet breaks of thigh. Anaerobic infection and tetanus in the rear hospitals were observed in casualties rarely.

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In connection with the fact that in the deep gypsum bandage the wound was inaccessible to surgeon's examination/inspection, and the

stormily flowed/occurred/lasted suppuration could be disseminated to the large vessels, appeared the real threat of secondary hemorrhage under the deaf gypsum bandage as a result of the dissemination and the lasting proteolytic activity of suppuration in the wound.

According to the data of personal observations, secondary hemorrhages occurred into 0.85c/c of cases.

With the secondary hemorrhage was produced the dressing of vessel near the wound. Only in 2 casualties with the hemorrhage of the femoral artery higher than withdrawal of a deep artery of thigh it was necessary to produce the dressing of external iliac artery, after which in one of them followed repeated hemorrhage and to it was produced the high amputation of thigh.

Attempts at the conservative conduct of casualties (absolute rest, the hemostatic doses of the transfused blood) only for the short period stopped the secondary hemorrhage which then was again repeated also unexpectedly, also, with an even greater force.

For stopping of the secondary hemorrhage, which arose under the gypsum bandage, femoral artery pressed by the hand, introduced through the window in the bandage on the stomach to the moment/torque the impositions of tourniquet, which was possibly only after the

removal/taking of gypsum bandage. Simultaneously produced transfusion the blood.

Since it was necessary to be convinced of the presence of the sufficient blood supply of extremity after the dressing of main-line trunk/stem, deaf gypsum bandage right after the stop of hemorrhage was not laid. Extremity was stacked to the splint and under the framework/body they warmed with the electric bulbs. After 3-5 days when they were convinced of the presence of sufficient collateral blood circulation, and the repeated blood transfusions ejected patient from the heavy condition after sharp/acute blood loss, on the extremity was laid deaf gypsum bandage. As a result of all measures all cases of secondary hemorrhage, except one, ended happily.

With the bullet break of thigh, complicated by suppurative infection, it was possible to observe suppurative flows among the extensive interfascial and intermuscular gaps/intervals by which is so rich the thigh.

The timely diagnosis of this complication was sufficiently complex, if treatment was conducted in the deaf gypsum bandage. In these cases the presence of flow or phlegmon could be determined only on the basis of general/common/total clinical symptoms.

Table 185. Frequency of complications the casualties have with the break of thigh, that finished treatment in the front line (first group) and rear (second group) area (in the percentages).

(1) Группа раненых	(2) Осложнения					
	(3) шок	(4) обильное гноное- вые раны	(5) анаэроб- ная ин- фекция	(6) гнойный артрит	(7) сепсис	(8) остеоми- елит
(9) Первая	19,3	9,4	33,4	2,9	17,4	8,9
(10) Вторая	5,0	30,4	7,1	2,8	8,2	33,4

Key: (1). Group of casualties. (2). Complications. (3). shock. (4). abundant festering of wound. (5). anaerobic infection. (6). suppurative arthritis. (7). sepsis. (8). osteomyelitis. (9). The first. (10). The second.

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Unconditional reading/indication to the removal/taking of gypsum for the examination of wound were the following symptoms: pain in the wound, deterioration in the general/common/total health, the high temperature, a change in the picture of the white blood (left-shift), a feeling of springing-away in the wound (bandage seems intimate), the sickness of inguinal glands, edema stops. If these symptoms or one of them caused suspicion to the presence of suppurative flow, then, in spite of complexity and undesirability of the shift/relief

of bandage, it it was necessary to nevertheless remove/take for the purpose of urgent surgical intervention.

After the removal/taking of bandage it was necessary upon the inspection/examination to consider typical localization of the flows: to the gunstock of flexors, bringing muscles and to the gunstock of the extensors of thigh. Most frequently suppurative flows were observed on the posterior surface of thigh, it is deep under the mass of the muscles of its front face, also, on the course of neurovascular bundle. However, the extensive decomposition of muscles and fascias frequently led to the untypical disposition of flows.

Already N. I. Pirogov noted: the "In proper time made sections/cuts with the stress/voltage, contra-apertures in the flows, extraction of the sequestered fragments during the abundant festering yes the calm and positive seat of term - thus principal substances".

For the autopsy of flows in the region the beds of extensors used longitudinal sections through the anteroexternal surfaces of thigh, which penetrated through the wide fascia of thigh and dully layered muscles to the bone; if fascia impeded the drain of pus, it they widely cut all over. The autopsy of flows and phlegmons, which were being arranged/located in the zone of medial fascial space, was

produced over the front/leading and posterior-internal surface of thigh.

Suppurative flows on the posterior surface of thigh in the bed of flexors, and on the course of sciatic nerve also revealed by from behind longitudinal sections; contra-apertures were laid depending on the disposition of flow; drainage and tampons were not used. After the autopsy of suppurative flows, which was produced on the apparatus for the traction/extensior, immediately was laid a gypsum bandage.

According to the data of the materials of personal observations, complication of wound sepsis they composed 4.50/o.

With the wound sepsis were used surgical interventions apropos of suppurative foci and repeated transfusions of the average doses of the blood (250 ml) in the combination with other general/common/total measures (sulfanilamide preparations, diet). While the systematic conducting of this procedure of the treatment of sepsis in many hospitals of the rear the recovery achieved 79.30/o of cases.

The frequent complication of the bullet breaks of thigh was osteomyelitis.

According to the data of the deepened development, osteomyelitis

was observed in 38.40/o of all casualties with the bullet break of thigh, who finished treatment in the deep rear (67.60/o of all cases of osteomyelitis of thigh fell to the crushed and comminuted fractures).

N. I. Pirogov about the severity of osteomyelitis of the thigh of bullet origin wrote: "The vast bone canal, opened sometimes to the significant space by the crushing of bone, he is coped of killing pyemic process; in it is developed osteomyelitis with abscesses and thromboses of bone veins, fragments are driven in into the open channel, are pinched there and they perform as foreign bodies.

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The periosteum, detached from the ends of the break and near-lying/near-horizontal muscles, loses capability for the education of bone weld; follows the numbness of fragments and exhausting festering" ¹.

FOOTNOTE ¹. N. I. Pirogov. Beginnings of general/common/total military field surgery, Vol. II, pg. 159, M., 1944. ENDFOOTNOTE.

Being the most frequent complication, especially in the hospitals of the deep rear, this disease attracted the attention of

the clinicians and anatomical pathologists and was caused in them vast interest.

The completely unsatisfactory results of conservative treatment, tendency toward the relapses and duration of course were the reason for the fact that in the rear hospital operational interventions were in essence directed toward the struggle with this complication. Thus, for instance, in the rear hospital, according to the data of personal observations, almost 40.0c/o of all surgical interventions composed operations/processes apropos of osteomyelitis.

After the establishment of the diagnosis of osteomyelitis, first of all, arose the question about the period of surgical intervention. In the hospitals of the deep rear was accepted the active tactics of surgical intervention in the early periods, since dominated the opinion that the presence of bone sequestrations supports inflammatory process in the surrounding tissues and impedes the formation of the callus. Operation/process apropos of osteomyelitis was undertaken after the thorough x-ray examination, which revealed/detected the presence of sequestrations and sclerosed sectors of bone.

Expectant tactics occurred when wound under the deaf gypsum bandage flowed/occurred/lasted smoothly, without the high

temperature, without the pains in the damaged extremity, i.e., when suppuration did not have a tendency toward the dissemination and it was possible to expect the strong/durable consolidation of break.

Operations/processes apropos of osteomyelitis of thigh preferred to produce under cerebrcspinal anesthesia or ether anesthesia. Necessary conditions was the imposition of tourniquet on the extremity.

Operation/process technique. Fistulas cut all over together with their surrounding scar tissue; pericsteum they stratified in the limits, necessary for the radical surgery. Was provided not only the removal/distance of free sequestrations, but also processing the ends of the broken ends of bone and disclosure/expansion of bone area according to the type of "canoe" ^["hollow"]. After this bone area was abundantly washed in warm physiological solution, they dried by towels, they abundantly filled by streptocide, edge wounds (skin and muscle) drew together by rare catgut sutures. Wound they covered by towel and was laid on the extremity deaf gypsum bandage.

If sequestrectomy it was produced with the formed callus, gypsum bandage was laid on 3-4 weeks, but if operation/process was earlier, then gypsum bandage changed in the dependence on the periods the consolidations and the course of wound process.

According to the personal observations of the authors, after the first operation/process of the recovery of osteomyelitis it did not attack/advance in 32.00/o of casualties, and these casualties repeatedly underwent operation/process. In 10.30/o, in spite of reiterative operations/processes and associated physiotherapy, patients were discharged with the phenomena of osteomyelitis. Healing occurred after entry into the hospital into 32.00/o, in 2 months - into 29.70/o, in 3 months - into 26.00/o, in 5 months - into 2.00/o; recovery did not advance into 10.30/o of cases.

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Although the best method of struggle with the begun septic complication of the bullet break of thigh was the secondary late processing, nevertheless, taking into account the heavy condition of casualties, sometimes it was necessary to immediately produce the amputation of thigh. So they came also in the absence of effect from reworking.

As readings/indications to the amputation they served: sharp deterioration in the general condition of casualty (high temperature, the quickened pulse, leukocytosis), the poor condition of wound

(suppurative impregnation of tissues, total muscular phlegmon, progressive osteomyelitis), the chronic suppurative intoxication, which develops according to the type of wound exhaustion (appearance of edemas, diarrheas, reactive condition of casualty, the low specific gravity/weight of urine, etc.).

In extra-heavy cases when, in view of the damage/defeat of heart, kidneys, the liver and the dissemination of a pyo-septic process, amputation proved to be hopeless, treatment remained conservative.

Amputation was produced by circular section/cut with the small front/leading graft/flap. Marrow area was not treated. For the provision of a good stump on the skin laid light traction/extension for those carried out through edge the skins of thread. This procedure made it possible to be achieved good results, and only in 2 cases it was necessary due to the faulty conical stump to produce re-amputation.

Late amputations in the rear evacuation hospitals in the poor general condition of casualties, which reached the sharp exhaustion, also did not rescue casualties.

Therefore during the treatment of the complicated bullet breaks

of thigh it was necessary to thoroughly weigh all clinical symptoms in order not to miss the moment/torque when amputation becomes necessary.

Based on materials of personal observations, amputation in view of the sepsis they were produced into 4.20/o all treated by deaf gypsum bandage.

During the damage to upper third of thigh with the dissemination of suppuration to the hip joint was produced exarticulation.

Sepsis, and according to the data of other rear evacuation hospitals, was the basic reason for the amputations, produced in 7.70/o of all treated apropos bullet breaks of thigh. According to the data of the deepened development of the histories the diseases/illnesses, from a number which were being treated in the rear by deaf and fenestrated gypsum bandage 6.10/o of casualties were discharged with the amputated extremity.

Taking into account those cases, in which the amputation was not produced as a result of the heavy general condition of the wounded and disseminated suppuration, it is necessary to recognize that sometimes the readings/indications to the amputation with the sepsis were not in proper time set.

Comparing the frequency of amputations with the bullet breaks of thigh after the application of deaf gypsum dressing with the frequency of amputation after other preceded it methods of immobilization, it is possible to state/establish that the amputations were used more rarely when wounded extremity was immobilized in combination with the skeletal/skeleton traction/extension. This coincidence is explained by the fact that the skeletal/skeleton traction/extension was used usually in the more mild cases; about this testify the following percentage data about the frequency of the use/application of that or sometimes of the form/species of therapeutic immobilization with the bullet breaks of thigh, complicated by the sepsis: splint - into 28.0c/o, deaf gypsum bandage - into 59.2c/o, fenestrated gypsum bandage - into 1.8c/o, skeletal/skeleton traction/extension and gypsum bandage - into 10.3c/o and other forms/species of immobilization - into 0.7c/o.

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Comparing these data with those given in Table 184, it is possible to note that with the sepsis the skeletal/skeleton traction/extension was used more rarely than in the entire group of the casualties, who finished treatment in the rear.

Deaf gypsum bandage created favorable conditions for the weakening of muscles and full/total/complete rest of the damaged extremity, removed the source of the onset of pains and at the same time it served as one of the best antipyretic substances. The supporters of the treatment of the breaks of thigh by one skeletal/skeleton traction/extension preferred to its method of deaf gypsum coating, "not functional" from their point of view, forgetting about the fact that both that and another method has its readings/indications and contraindications, its deficiencies and advantage.

Skeletal/skeleton traction/extension sometimes better solved a question of the reposition of broken ends, but this advantage went to the detriment of the basic requirement to create the rest of the damaged extremity, so/such necessary for dealing with the infection.

Deaf gypsum bandage provided the reliable immobilization of extremity and during the correct use/application of therapeutic gymnastics and physiotherapy gave results, in functional sense differing little from the results, obtained after skeletal/skeleton traction/extension.

The well modeled gypsum bandage during the satisfactory standing of broken ends made it possible to painless match movements and active gymnastics and to prevent contracture and atrophy of muscles.

Based on materials of personal observations, the percentage of contractures and limitation of movements in the discharged casualties, without depending on other outcomes (osteomyelitis, deformation, etc.), was equal to 27.7. If was allowed the general condition of casualty, therapeutic gymnastics appointed very early, first in the form of the movements by fingers/pins and feet of wounded extremity and in the joints of healthy/sound extremity, gradually expanding the volume of movements. As soon as general condition it was improved and temperature became normal, to casualty they proposed to move with the support of the plastered extremity to the metallic striving. Furthermore, casualties were occupied daily on the special complex in the office of the therapeutic exercise.

After the removal/taking of deaf gypsum bandage in the presence the consolidations of break, besides the therapeutic exercise, extensively used massage, paraffin/kerosene and peat application to the wounded extremity. With the particularly firm contractures the exercises therapeutic gymnastics were appointed on 2-3 times a day.

From the material of the series/number of evacuation hospitals

it is evident that therapeutic gymnastics was used into 19.00/o and in combination with the physiotherapy into 63.40/o.

The high value during the treatment of bullet breaks had not only the local treatment of wound, but also general/common/total measures, especially the blood transfusion, readings/indications to which with each year of war were expanded.

According to the materials of the deepened development, casualties with the bullet break of thigh, which finished treatment in the deep rear, the blood transfusions were produced on PMF into 1.00/o of cases, on DMP - into 7.50/o, in KhPEG - into 9.90/o, in the army hospitals - into 5.80/o, in the front line ones - into 16.60/o and in the rear ones - into 27.40/o, in several ones of these therapeutic installations - into 30.80/o and in other therapeutic installations - into 1.00/o of cases.

Very heavy to casualties with the prolonged suppurative intoxication with the vast loss with pus of protein produced the repeated transfusions of conserved blood on 225-250 intermittent ml during 5-6 days, and also transfusion plasma, which even better was transferred by casualties.

The average duration of the hospital treatment of casualties with the bullet break of thigh with the use of a gypsum bandage, according to the data of author's development, was following: 2 months - 5.40/o, 3-4 months - 27.80/o, 5-6 months - 17.40/o, 7-8 months - 24.60/o, 9 months - 13.30/o, 10 months greater - 9.80/o, it is unknown - 1.70/o.

Thus, in the course of the first 6 months after wound they finished treatment 50.60/o of casualties. According to the data of the series/number of rear hospitals, the average duration of hospital treatment was equal to 200 days.

Based on materials of the deepened development, an average quantity of days, carried out in the hospitals by casualties with the bullet break of thigh, that finished treatment in the deep rear, was equal to 189, and finished treatment in the front rear - 140.

A descent in the duration of treatment in the hospitals of front to 140 days is explained by a relatively larger quantity of casualties with the incomplete break of thigh, and also casualties whose treatment ended by amputation or lethal outcome.

The periods of the education of the callus to a considerable extent depended on the severity of process, degree of the decomposition of bone, correctness of the standing of broken ends and quality of immobilization.

The average period of the education of strong/durable callus, based on materials of the deepered development, in casualties, who finished treatment in the front rear, was equal to 2.5 months, and in those finished treatment in the deep rear - 3.2 months.

Above discussion centered on the fact that in a significant quantity of cases (21.4c/c) was performed late reworking. Since in this case were removed dead bone fragments, sawed down and bit the casualty by osteomyelitis fragments of bone, then sometimes appeared the significant defect of bone for elimination of which was required prolonged period. Such an intervertion, however, was justified by a significant improvement in the general condition of casualty.

Table 186. Period of the education of the callus with the bullet breaks of thigh in casualties, who were being treated in the rear evacuation hospitals (in the percentages).

(1) Срок образования костной мозоли	(2) Данные материалов	
	(3) углубленной разработки	(4) личных наблюдений
2 месяца (5)	16.0	11.1
3 "	25.2	21.3
4 "	20.9	26.1
5 месяцев (6)	9.6	6.4
6 и более месяцев (7)	9.4	27.5
Неизвестно (8)	0.2	—
(9) Консолидация не наступила (ложный сустав, умерли до наступления консолидации, ам- путации)	18.7	7.6
(10) Итого	100.0	100.0

Key: (1). Period of the education of the callus. (2). data of materials. (3). deepened development. (4). personal observations. (5). month. (6). months. (7). and more than months. (8). It is unknown. (9). Consolidation it did not advance (dummy joint, they died to offensive of consolidation, amputation). (10). Altogether.

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Clinical outcomes during the treatment of the bullet breaks of bucket by deaf gypsum bandage should be evaluated according to the anatomical and functional results which, based on materials of personal observations, were following: into 27.70/o of cases were contractures, into 10.00/c - incorrectly grown together breaks, into 34.30/o - shortenings of extremity more than 3 cm, and into 10.30/o - osteomyelitis.

Anatomical and functional results were considered independent of presence in other wounded complications (for example, the case, which ended by contracture and osteomyelitis, it was represented in the section of contractures and in the section of osteomyelitis).

Based on materials of personal observation, from the obtained responses/answers to the sent out by casualty questionnaires were explained the distant results of the treatment of the bullet breaks of thigh by deaf gypsum bandage.

The results of treatment, according to the obtained

responses/answers, were estimated as good, satisfactory and poor. Results were considered good, if in the absence of relapse casualties could be occupied by manual labor, they freely put to use extremity and did not complain on the pain.

As the poor results they considered, if casualty was continued to complain about edemas, pains, immobility in the large/coarse joint, impossibility to put to use extremity without crutch or bacilli/rods.

If casualties during the small limitation of movements could be occupied by the adequate/approaching for their professional/occupational work and experienced pain only with the walking, also results could be considered satisfactory.

Casualties with the presence of osteomyelitis after extraction or its relapse are isolated in the individual group. The cases of amputation after extraction from the hospital it was not.

Are given below the numerals, which characterize the distant results of the treatment of the bullet breaks of thigh by deaf gypsum bandage according to form data.

(1) Отдаленные результаты	(2) Процент
(3) Хорошие	48,0
(4) Удовлетворительные	27,9
(5) Открылись свищи	19,5
(6) Плохие	4,6

(7) Всего . . . 100,0

Key: (1). Distant results. (2). Percentage. (3). Good. (4).

Satisfactory. (5). Were opened/discovered fistulas. (6). Poor. (7).

In all.

Attention is drawn to the fact that in casualties after extraction from the hospital greatly slowly was reduced the function of joints.

By deficiencies in the method of deaf gypsum coating was the abundant impregnation of bandage pus, also, because of this the presence of the unpleasant odor with which is difficult to struggle, softening bandage as a result of the soaking by pus, maceration of skin and bedsores. For decreasing the bad odor the places of soaking lubricated by iodine liquid, and recently, in addition to this, were bored by drill small apertures for the drain of pus. Ye. V. Smirnov for the annihilation of odor proposed to use a chlorine-gypsum bandage. V. A. Petrov considered that the best method to avoid odor - early use/application of a deaf gypsum bandage to the well processed wound.

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For the purpose prophylaxes and elimination of maceration upon the shift/relief of gypsum bandage skin around the wound lubricated by 50/0 solution of potassium permanganate. To avoid bedsores under the bone prominences of pelvis and rump laid special wadded cushions/pads.

Thus, the experiment/experience of the Great Patriotic War the treatment of the bullet breaks of thigh showed that the deaf gypsum bandage provided simultaneously the rest of extremity and functional treatment. Therefore, it rightfully widely was introduced, beginning from the army installaticrs and finishing with the hospitals of the deep rear. Especially good results are obtained under the condition sufficiently a good primary processing of wound within the nearest from the wound periods, early application of gypsum dressing with the preliminary correction of broken ends. With the unsatisfactorily superimposed bandages, in the incorrect position/situation of broken ends or the presence of any complications the shift/relief of bandage in the rear evacuation hospitals was considered necessary. The attempts in these cases to treat the casualties by sulfanilamides, by the transfusion of blood and the like without the examination of wound and its repeated surgical processing led to the severe complications.

The positive sides of deaf gypsum bandage did not eliminate the use/application of skeletal/skeleton traction/extension, in particular with the incorrect standing of broken ends, not removed by bandage.

It is known that a great quantity of complications appeared as a result of infection, which lengthened the periods of treatment and made outcomes worse; therefore during the treatment of the bullet breaks of bucket under conditions of the deep rear primary attention turned to the struggle with the suppurative infection.

Treatment of the bullet breaks of thigh by skeletal/skeleton traction/extension.

Treatment of the bullet breaks of thigh by skeletal/skeleton traction/extension in the front line area.

Honored Scientist professor is the lieutenant general of medical service N. N. Yelanskiy.

However, from the first year of war skeletal/skeleton traction/extension with the bullet breaks of thigh extensively was

used in the rear evacuation hospitals, where the large part of the casualties entered the deaf gypsum bandages, superimposed in the front line area. Already since 1943 skeletal/skeleton traction/extension they began to use in the presence of the corresponding readings/indications in the specialized front line evacuation hospitals.

The periods of the entry of casualties with the bullet break of thigh into the specialized hospitals of front rear varied sufficiently widely. Thus, according to A. N. Berkutov's data, on the N-skol front in 1944 casualties with the bullet break of thigh arrived into the front line specialized hospitals within the following periods after the wound: during the first 3 days - 8.50/o, on the 4-5th day - 21.20/o, on 6-7th day - 25.50/o on the 8-10th day - 21-20/o, through 11 and more than days - 23.60/o.

At the moment of arrival into the front line hospitals, according to A. N. Berkutov, 18.70/o of casualties were in satisfactory state with the normal temperature, 58.10/o - with the temperature to 38°, 22.80/o - in the heavy condition with the temperature higher than 38° and 0.40/o entered in the condition of shock.

Readings/indications to the disposition of skeletal/skeleton

traction/extension were placed in the front line hospitals both by the casualties, who arrived in the transport splints and wounded, who arrived in the gypsum bandages which were superimposed in the army specialized hospitals within the following periods, according to A. N. Berkutov: from 4 to 8 days - into 2.00/o, from 9 to 10 days - into 8.00/o, from 11 to 16 days - into 10.00/o; into 80.00/o of cases the bandage was not removed/taken.

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Thus, the later superimposed in the army area the deaf gypsum bandages, the more frequently it was necessary to remove/take them and to replace by skeletal/skeleton traction/extension.

In the majority of cases (80.00/o) as reading/indication to the removal/taking of deaf gypsum bandage served septic intoxication, into 8.00/o of cases - hemorrhage, into 8.00/c - pains and into 4.00/o - violation of integrity and the unsatisfactory condition of gypsum bandage.

The imposition of skeletal/skeleton traction/extension in the front line hospitals was produced from the following readings/indications:

1) the heavy general condition of casualty, with chills, then and by the loss of appetite;

2) the temperature body is higher than 38° with the oscillations/vibrations to $1.5-2^{\circ}$;

3) edema of the damaged segment of extremity;

4) necrotic tissues in the wound with edema and prolapsing of muscles into the wound;

5) the education of suppurative accumulations in the tissues in the periphery of wound canal;

6) the pains, which depend on the development of infection in the wound;

7) the repeated hemorrhages, which ended by the dressing of vessel;

8) the displacement of broken ends, which does not yield to elimination with one-time setting on the orthopedic table.

Skeletal/skeleton traction/extension in these cases was

conducted in the complex with surgical intervention in the form of reworking of bone wound and wound of soft tissues, with the sulfanilamide therapy, by the blood transfusion and by physiotherapy.

In certain cases, if infection was propagated further, were produced repeated surgical interventions.

The periods of the use/application of skeletal/skeleton traction/extension were determined by clinical picture. The target of traction/extension was considered achieved, if temperature in casualty descended, wound was cleaned of the necrotic tissues, edema dropped, a quantity of suppurative discharge was decreased and the broken ends of bones accepted correct position. For this in the majority of the cases it was required not more than 7-10 days and only into 3.50/o of cases (according to S. I. Banaytis) - to 15 and more than days. Within this period usually it was possible to arrest the heavy manifestations of infection in the wound and to attain the correct position of broken ends, but fusing of fragments even by fibrous tissue within this period, of course, it could not advance.

Skeletal/skeleton traction/extension under conditions of the front line evacuation hospitals not at all did not pursue the problem of attaining the intergrowth of break, but had in mind only struggle with the complications and bringing/finishing casualties to the

transportable condition. As soon as this target it was achieved, casualties they immediately translated to the immobilization by deaf gypsum bandage and they evacuated into the rear. Thus, skeletal/skeleton traction/extension in the front rear was only one link in the chain of measures during the stage treatment of the bullet breaks of thigh.

Treatment of the bullet breaks of thigh by skeletal/skeleton traction/extension in the rear evacuation hospitals.

Pochent A. M. Brook.

On materials of the deepened development of the histories of disease/illness, casualties with the bullet break of thigh skeletal/skeleton traction/extension in all stages was laid only into 13.10/o of cases; in casualties, who finished treatment in the rear, therapeutic of immobilization was following forms/species: into 15.60/o of cases - gypsum splin , into 67.80/c - deaf gypsum bandage, into 0.70/o - skeletal/skeleton traction/extension, into 14.00/o - skeletal/skeleton traction/extension with the preceding or subsequent gypsum bandage and into 1.90/c - other forms/species of fixation.

The overwhelming majority of casualties by which the traction/extension was used in the front line area, finished treatment in the rear evacuation hospitals; therefore by casualty, who finished in them treatment, traction/extension was used somewhat more frequent (14.70/o), than by all casualty (13.10/o), regardless of where they ended their treatment. Hence it is possible to make the conclusion that in the rear evacuation hospitals the traction/extension did not have wide distribution.

Skeletal/skeleton traction/extension in the pure form/species was encountered less than into 1.00/o of cases, predominantly it was combined with the application of gypsum dressing after the known period of traction/extension or, on the contrary, gypsum bandage was relieved by skeletal/skeleton traction/extension.

By the preferred method of the treatment of the bullet breaks of thigh remained immobilization gypsum bandage, to what contributed known experience in the war with the White Finns, and also in the first period of Great patriotic war.

Another important reason for the preferred use/application of gypsum bandage consisted in the simpler subsequent care of casualties under conditions of stage treatment.

The trained for a new profession into the surgeons doctors of other specialities, of course, were easily seized deaf gypsum bandage, than by treatment by skeletal/skeleton traction/extension.

The use/application of skeletal/skeleton traction/extension on the years of war, according to the data of the deepened development of the histories of disease/illness, evidently from Table 187.

During the first two years of war skeletal/skeleton traction/extension had greater use, because deaf gypsum bandage was not so disseminated as during the subsequent years. During the first years of war into the rear evacuation hospitals entered numerous casualties with the insufficient gypsum immobilization which it was necessary to replace by traction/extension.

Table 187. Use/application of skeletal/skeleton traction/extension on the years of war in the percentage with respect to all forms/species of therapeutic immobilization.

(1) Вид иммобилизации	(2) Год войны				(7) За все годы
	(3) первый	(4) второй	(5) третий	(6) четвертый	
(8) Скелетное вытяжение	1,7	0,8	0,6	0,3	0,8
(9) Скелетное вытяжение с последующей гипсовой повязкой	7,5	4,6	3,4	3,6	12,3
(10) Гипсовая повязка с последующим скелетным вытяжением	8,1	8,4	5,5	5,6	
(11) Всего . . .	17,3	13,8	9,5	9,5	13,1

Key: (1). Form/species of immobilization. (2). Year of war. (3). the first. (4). the second. (5). the third. (6). the fourth. (7). In all years. (8). Skeletal/skeleton traction/extension. (9). Skeletal/skeleton traction/extension with subsequent gypsum bandage. (10). Gypsum bandage with subsequent skeletal/skeleton traction/extension. (11). In all.

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For the detailed study of the used during the Great Patriotic War method of skeletal/skeleton traction/extension it is used the material of the deepened development of the histories of disease/illness, and also personal observations of 670 casualties with the bullet break of thigh, treated by skeletal/skeleton

traction/extension in the evacuation hospitals of the deep rear. Their distribution according to form/species and character/nature of wound is evident from Table 188.

The significant specific gravity/weight of bullet, and also perforating wounds in any way does not reflect as a whole of the character/nature of wounds and form/species of the wounding weapons with the bullet breaks thigh, but he indicates only the special feature/peculiarity of the selection of casualties for the treatment by skeletal/skeleton traction/extension from the special readings/indications.

We give the distribution of the casualties, treated with skeletal/skeleton traction/extension according to the level of the break of thigh (Table 189).

As can be seen from given data, the basic contingent of casualties with the bullet break of thigh, treated by skeletal/skeleton traction/extension, comprised casualties with the break of middle and upper third of thigh.

Skeletal/skeleton traction/extension most frequently was used with the cross (into 20.60/o) and oblique (into 19.80/o) break, with which one-time repositioning was produce more difficultly than with

crushed (10.40/o) or large/coarse and small-splintered break (18.70/o).

Skeletal/skeleton traction/extension in the rear hospitals was laid in the majority of the cases on five-seven that passed by casualty stage and in the minority of the cases - in the eighth-tenth stage, always within the late periods.

Table 188. Distribution of the casualties, treated by skeletal/skeleton traction/extension, according to form/species and character/nature of wound (in the percentages).

(1) Материал	(2) Вид и характер ранения				(5) Итого
	(3) пулевое		(4) осколочное		
	(6) сквозное	(7) слепое	(6) сквозное	(7) слепое	
(8) Углубленная разработка историй бо- лезни	51,3	10,3	19,4	19,0	100,0
(9) Личные наблюдения	40,0	12,0	23,0	25,0	100,0

Key: (1) . Material. (2) . Form/species and character/nature of wound.
 (3) . bullet. (4) . fragmentation. (5) . Altogether. (6) . through. (7) .
 through. (8) . Deepened development of histories of disease/illness.
 (9) . Personal observaticns.

Table 189. Distribution of wounded, treated with skeletal extension, by level of fracture of the thigh (in %).

(1) Уровень перелома по третям бедра	(2) По материа- лам углуб- ленной раз- работки истории болезни	(3) По материа- лам личного наблюдения
(4) Верхняя	33.0	23.7
(5) Средняя	41.0	30.6
(6) Нижняя	19.0	40.6
(7) Несколько третей . .	7.0	5.1
(8) Из них проникающих:		
а) в тазобедренный сустав	1.0	3.6
б) в коленный су- став	3.3	15.2

Key: (1). Level of break on thirds of thigh. (2). Based on materials of deepened development of histories of disease/illness. (3). Based on materials of personal observation. (4). Upper. (5). Average/mean. (6). Lower. (7). Several third. (8). From them penetrating: a) into hip joint; b) into knee joint.

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The primary surgical processing of the bullet breaks of thigh, which were subjected subsequently to treatment skeletal/skeleton traction/extension, was produced into 72.00/o, moreover splitting up was produced into 53.00/o, carving - into 13.00/o, splitting up and carving with the dressing of vessels - into 2.00/o, with the removal/distance of foreign body - into 5.00/o with the removal/distance of bone fragments - into 18.00/o, with processing of

bone - into 1.00/o, other - into 1.00/o are unknown - into 7.00/o.

If we compare these data with the character/nature of processing with all breaks of thigh, independent of the character/nature of immobilization, then special difference it is impossible to note.

The significant percentage of the casualties (28.0), who were not undergoing primary surgical processing and treated subsequently by skeletal/skeleton traction/extension, is explained by the fact that this group hit in essence the casualties with the bullet break of thigh, which flowed/occurred/lasted over the type of the closed break, in the presence of small entrance and outlet both without the significant damage of the surrounding tissues and without hematoma.

The primary surgical processing of the bullet breaks of thigh, treated subsequently by skeletal/skeleton traction/extension, was performed into 30.00/o of cases to 12 hours, into 18.00/o of cases - from 13 to 24 hours, in 20.00/o hour of the first day it was not established/installed also into 32.00/o - into the second day and it is later; these periods barely differ from the periods of surgical processing with all breaks.

The immobilization, which put to use the casualties prior to the beginning of skeletal/skeleton traction/extension, consisted into

16.00/o of the different splints, into 3.00/o - from the fenestrated gypsum bandage and into 81.00/o - from the deaf gypsum bandage.

It is necessary to note that in the majority of the cases the casualties arrived into the rear hospitals in the completely satisfactory deaf gypsum bandage.

The need of removing/taking the gypsum was caused: 1) by complication from the side of wound and severity of the general condition of casualty, 2) by unsatisfactory in the technical sense gypsum bandage even 3) by the incorrect standing of broken ends.

In the rare cases it was necessary to remove/take gypsum bandage PTO of any one of these reasons, usually there were noted several, moreover the frequency of each separately of that undertaken was the following: into 75.00/o - complications of wound, into 20.00/o - incorrect standing of broken ends, into 20.00/o - softening bandage as a result of the abundant soaking by pus, into 15.00/o - poor bandages on other reasons.

For the characteristic of the complications, which were being observed in casualties, who were putting to use skeletal/skeleton traction/extension, are given comparative data, that concern the principal complications which were observed in the casualties with

the different genus of therapeutic immobilization (Table 190).

From Table 190 it is evident that the early complications occurred during the treatment of the bullet breaks of thigh by the different methods of immobilization.

In casualties, treated by gypsum splint, it is considerably more frequently than in casualties, treated by the immobilization of another form/species, were observed the complications of shock, by anaerobic infection and by sepsis and were considerably more rarely observed the contractures and the complications, caused by pyogenic infection. Is less expressed difference in the frequency of complications between the casualties, treated by gypsum bandage and by skeletal/skeleton traction/extension, moreover less than complications is on the casualties, treated skeletal/skeleton by traction.

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This interrelation between the complication and the immobilization is completely natural, since they are located in direct dependence on the character/nature of damage. Thus, for instance, among the casualties, treated skeletal/skeleton traction/extension, it was not easily casualties with the incomplete break and few heavily wounded

with crushing and crushing of bone; therefore in this group the wounded less anything it was complications gaseous infection, by sepsis and by suppurative arthritis; in the relation to almost all other complications this group occupied the middle place, but in the relation to festering the first.

The data in Table 190 encompass all complications observed in wounded prior to the employment of traction as well as in the course of treatment with traction.

Under conditions of the deep rear, by the moment of application of skeletal traction infection either covered small sections of subcutaneous fat and muscles or developed in the form of large but limited abscesses or else in the form of bilious intermuscular phlegmons which first require thorough evacuation and drainage.

The stimulator of the purulent processes in soft tissues in the majority of cases was staphylococcus albus and staphylococcus aureus or, much more rarely, streptococcus. There were no cases of anaerobic infection in the process of treatment with skeletal traction which is explained, of course, by the appropriate selection and observance of prophylaxis measures at the forward stages of evacuation as well as in the course of treatment in the deep rear.

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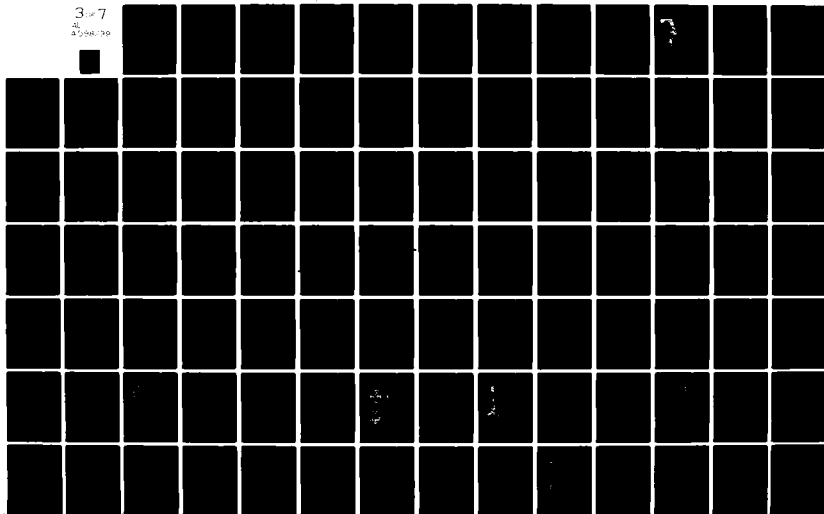
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EXPERIENCE OF SOVIET MEDICINE IN A GREAT PATRIOTIC WAR 1941-194--ETC(U)
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As reading/indication to the skeletal/skeleton traction/extension during the treatment of osteomyelitis of the thigh of bullet origin served sharp strains and shortening after the incorrectly grown together break. The imposition of skeletal/skeleton traction/extension preceded the operation/process of disuniting the commissure of break, if by that time already advanced consolidation, and sequesterotomy.

Bullet osteomyelitis were encountered in the subacute and chronic form and were characterized by the series/number of local and general/common/total symptoms. The local symptoms included the fistulas with the suppurative liberation/excretion in which it was possible to reveal fine/small sequestrations and "bone sand". Free sequestrations and sequestral capsule distinctly were determined in the X-ray photograph, and the course of fistula - on fistologram and by probe.

Table 190. Frequency of complications in casualties with the bullet break of thigh, treated treated by immobilization of different type (on 100 casualties according to each form/species of immobilization).

(1) Лечебная иммобилизация	(2) Осложнение						
	(3) шок	(4) анаэробная инфекция	(5) сепсис	(6) гнойная артрит	(7) нагноение и затек	(8) остеомиелит	(9) контрактура и ограничение движений
(10) Гипсовая шина	15,0	32,5	13,1	2,6	20,2	17,1	33,1
(11) Глухая и окончатая гипсовая повязка	3,9	5,5	10,2	3,4	28,5	40,9	74,6
(12) Скелетное вытяжение одно и в комбинации с гипсовой повязкой	4,6	2,2	6,7	1,4	30,5	38,3	63,2

Key: (1). Therapeutic immobilization. (2). Complication. (3). shock. (4). anaerobic infection. (5). sepsis. (6). suppurative arthritis. (7). festering and flows. (8). osteomyelitis. (9). Contracture and limitation of movements. (10). Gypsum splint. (11). Deaf and fenestrated gypsum bandage. (12). Skeletal/skeleton traction/extension one and in combination with gypsum bandage.

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From the general/common/total symptoms of subacute and chronic osteomyelitis called to itself the attention is the developed frequently anemia and the local aggravations of infection, connected with the sharp/acute feverish condition. Sometimes it was possible to observe appearance in the urine of the trails of protein, fresh

erythrocytes, transparent cylinders - signs of sharp/acute inflammatory and degenerate complication from the side of kidneys. If after the imposition of skeletal/skeleton traction/extension was developed sepsis, then skeletal traction/extension immediately was removed/taken and further treatment occurred according to the general/common/total rules: sections/cuts, amputation and immobilization from the readings/indications.

Infectious complications with the bullet breaks of thigh, which were undergoing treatment by skeletal/skeleton traction/extension, with the clinical course it is possible to subdivide into three bases of form: moderate wound intoxication, acute wound intoxication and septic forms.

The moderate form of intoxication was characterized by the general satisfactory condition of casualties, by a good appetite and sleep. Temperature was raised by evening in repartitions/conversions of 37.4-37.8°; pulse was satisfactory filling, 80-90 strikes/shocks per minute. The condition of wound is satisfactory: the split wound is covered with fresh, succulent rose-colored granulation with the moderate liberation excretion in the majority of the cases of thick pus. Preferred flora - Staphylococcus aureus. This complication after a 2-3- weekly feverish period usually under the effect of the rest, which strengthens overall treatments, antiseptic bandages and

internal administration sulfanilamide preparations was finished with recovery.

With this form was especially shown skeletal/skeleton traction/extension.

By the example of treatment as skeletal/skeleton traction/extension with the moderate intoxication can serve the following observation.

K., 35 years, is wounded by fragment into the left thigh in upper third with the break of the bone 9/III 1943.

It entered on DMP with the diagnosis: the blind-end fragmentation wound of upper third of left thigh. During the same day on DMP under chloroform anesthesia it was produced splitting up of wound and was superimposed bandage from emulsion of streptocide and splint of Diterikhs.

Subsequently in the front rear the wound suppurated, and 12/III under ether anesthesia was produced the examination of wound, extracted metallic foreign body was superimposed coxitic gypsum bandage.

12/IV in the X-ray photograph is established/installed a comminuted fracture of thigh with the displacement of broken ends, 12/IV, in view of the high temperature with chills, leukocytosis to 17 500 and the shift/shear of leukocytic formula to the left, gypsum bandage was taken/removed.

22/IV with the temperature to 38.6° and the swelling of knee joint is made the puncture of knee joint. Is obtained turbid fluid/liquid.

25/IV at a lowered to 36.3° temperature in the morning and to 36.9° is in the evening produced new operation/process under the cerebrospinal anesthesia. In middle third of thigh is split the wound, is extracted metallic fragment (bullet jacket) and is superimposed skeletal/skeleton traction/extension through tuberosity of the tibia.

28/IV temperature of 36.8-37.7°. Bandage abundantly gets wet by malodorous pus, why into the wound was introduced tampon with hypertonic solution.

4/VI is opened suppurative flw. 11/VI is taken/removed skeletal/skeleton traction/extension.

13/VI is superimposed the deaf gypsum bandage in which large soon began to walk on the crutches.

14/VII in the presence of consolidation is for a second time opened the flow of pus; is noted the shortening of extremity on 2 cm.

23/VII with roentgenoscopy is discovered the metallic fragment between the bone fragments.

1/VIII under the local anesthesia on the spot of break is bared the osteomyelitic area on expansion of which are removed many bone ones and 2 metallic fragments. After this operation/process the wound was closed during 1 1/2 months.

Through 9 months casualty after discharging from hospital with sharp limitation of movements in the knee joint.

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The given observation is interesting in view of the incorrect definition of the means of wound, since in the card of forward area and in the final (commission) epicrisis there was diagnosed blind-end fragmentation wound, while on operation/process (25/IV) was removed the piece of bullet jacket, and in the X-ray photograph are

completely distinctly visible the units of the torn bullet which roentgenologists defined as "metallic fragments" (Fig. 160).

The sharp/acute form of intoxication is characterized by the noticeable decline of forces, by reduction in the appetite, by alarming mood. Morning temperature keeps in limits of 37.5-38.5°, evening - 38-39°. A pulse of satisfactory filling, to 100-110 strikes/shocks per minute, a quantity of hemoglobin it is considerably lowered, and a number of leukocytes and ROE they are increased. Leukocytosis achieves 20,000-25,000; it is determined the shift/shear of leukocyte formula to the left. Granulation pale, wound separated skiapy, purulent liquid, tissue around the wound is infiltrated. Flora wounds compose staphylococci or streptococci, and sometimes staphylococci and streptococci.

This form was encountered it was encountered in the hospitals of the rear in the relatively fresh cases through 3-4 weeks from the moment/torque of wound. Frequently in this case was observed the development of osteomyelitic process with the presence of sequestrations; were revealed the suppurative flows in the soft tissues of thigh, the foreign bodies (metallic and other origin), which support infection, and also become numb bone fragments. Almost in all cases of this form was required late or secondary surgical processing, after which was laid skeletal/skeleton

traction/extension.

Septic condition was characterized by the sharp, rapidly progressive course. Temperature by evenings with small remissions reached to 39° and it is above, the morning temperature continuing to remain high - in limits of 38° and 39°. Pulse frequent, to 120 strikes/shocks per minute, weak filling. Appetite is absent, the sleep of poor. Patients first are flaccid and apathetic, then they are agitated, they are delirious. From the side of the blood is observed the sharp shift/shear of leukocyte formula to the left, an increase in the stabnuclear forms, the appearance of young forms, the disappearance of eosinophils and the significant decrease of lymphocytes. In the urine is noted the appearance of protein, leukocytes, sometimes erythrocytes and transparent cylinders. Granulation in the wound flaccid, sometimes vitreous, with skippy discharge. In suppurative discharge most frequently is revealed the streptococcus.

This form was encountered more rarely and presented the general/common/total disease, caused by acute intoxication out of the stricken area to the force of the high virulence of flora and poisoning by fission products with the insufficient local immunobiologic defense and the general/common/total resistivity of organism. In these cases was required the active surgical and

general/common/total treatment. Septic condition was contraindication to the use/application of skeletal/skeleton traction/extension.

Other complications it is necessary to note the high percentage of contractures, but during the treatment by skeletal/skeleton traction/extension they were encountered nevertheless more thinly/less frequently than during the treatment by gypsum bandage.

Judging by the clinical outcomes of the bullet breaks of thigh during the treatment by skeletal/skeleton traction/extension and by gypsum bandage, skeletal/skeleton traction/extension in a number of cases did not prevent the development of the limitation of mobility and contracture in the large/coarse joints.

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Fig. 160. Grown together bullet break of upper third of left thigh with multiple fine/small metallic fragments from torn bullet jacket (wounded K).

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The contractures of extremities as a result of the damage of soft tissues and bone of thigh were encountered after treatment by skeletal/skeleton traction/extension into 63.20/o and depended on Rubtsov, the damages of nerves, and also from the degenerate processes, caused by prolonged immobilization. The functional treatment, which was being conducted in the process of skeletal/skeleton traction/extension, helped to decrease a number of contractures, which developed as a result of prolonged rest.

The strains, which depend on the bending of the axis of thigh, the displacement of broken ends along the length in the period of the consolidation of the break, defect of bone substance and formed on this basis dummy joint, from the pathological processes in the joints, which accompanied breaks, could be removed only by special measures.

Based on materials of the deepened development of the histories of disease/illness, pseudarthroses were observed with the skeletal/skeleton traction/extension more frequently than with other forms/species of therapeutic immobilization.

One of the rare complications was kidney stones (1.50/o). The symptoms of urolithiasis were following: the attacks/seizures/paroxysms of sharp pains in the lumbar region and

the stomach with the irradiation into the inguinal region and the urinating canal, that were being continued usually for 1-2 hours, the blood and oxylates, detected in the urine in the form of sand. In one case, which was being observed by the author, withdrew the calculus/stone with the size/dimension 0.5x0.5x0.5 cm. In other case of urolithiasis the author incorrectly diagnosed acute appendicitis, and to patient it was erroneously produced appendectomy.

Urolithiasis treated symptomatically; it did not serve as contraindication to the skeletal/skeleton traction/extension.

Complications, which were being developed in the bond with skeletal traction/extension. Skeletal/skeleton traction/extension, since its imposition is connected with surgical intervention, could be the reason for one or the other complications. The recording of infection onto the bone by spoke and by clamp it was possible to easily avoid, thoroughly observing a strict asepsis during their introduction and daily handling casualty with the superimposed skeletal/skeleton traction/extension.

In spite of the significant lengthening of the periods of skeletal/skeleton traction/extension (to 45 days), according to the materials of personal observation, not in one case arose

osteomyelitis of bone the place of conducting spoke or wedging of clamps. In the unitary cases of the near entrance or outlet of spoke or clamp appeared pyoderma which kept 5-6 days and under the action of ultraviolet lighting disappeared.

In several cases there was a subcutaneous abscess with the insignificant inflammatory infiltration around the aperture of canal. By the puncture of scalpel they unloaded abscess, and wounds rapidly healed. Frequently during the removal/distance of spoke or clamp in the region of aperture appeared several drops of pus without the signs are inflammatory of reaction all around.

After removal/distance the spokes of wound lubricated by the liquid of iodine and glued up by sterile towel; after 4-6 days of aperture they were occluded by incrustation and healed. From another complications can be noted the education of the pin-head blisters on the skin with the traction/extension with the cleol - result of chemical and mechanical stimulation/irritation. These blisters under the aseptic bandage after 4-5 days healed under the crust.

On the basis of data of the deepened development of the histories of disease/illness and materials of personal observation it is possible to draw the conclusion that the skeletal/skeleton traction/extension by itself did not cause serious complications.

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Readings/indications and contraindication to the treatment of the bullet breaks of thigh by skeletal/skeleton traction/extension. During the treatment of the bullet breaks of thigh were necessary such measures of therapeutic order/formation, with the aid of which it is possible to attain the reduction of the normal relationship/ratio of tissues, i.e., the healing of wound and consolidation of the break in the correct position, the reduction of the function of damaged extremity, and also overcoming of the aftereffects of trauma.

Important problem was the reposition of the displaced broken ends of thigh; during the stable retraction of muscles was required skeletal/skeleton traction/extension lengthwise.

Skeletal/skeleton traction/extension showed unconditionally positive effect on the process of the regeneration of bone after break, i.e., for the education of the callus. With the skeletal/skeleton traction/extension was provided the possibility of the constant examination/inspection of research, supervision of the bullet wound of thigh and local treatment of wound process.

Readings/indications to the use/application of skeletal/skeleton traction/extension surgeon placed, on the basis of the accounting to localization, the character/nature of break, periods, which passed from the moment/torque of wound, the complications of wound process and general condition of casualty.

Skeletal/skeleton traction/extension with the bullet breaks of thigh is shown: with any localization of break; with any full/total/complete break (cross, longitudinal, oblique, large/coarse and small-splintered) without the significant defect of bone; during the extensive damages of soft tissues; with the bedsores, the macerations, the flows (after their autopsy) for the provision of scope during any therapeutic manipulations; during the significant shortenings and the displacement within the early and late periods after wound.

As contraindication to the skeletal/skeleton traction/extension they served: the sharp exhaustion of casualty, which increases septic condition and sepsis, the crushed breaks with the defect into 5-6 cm (to avoid the education of dummy joint), combined breaks, which penetrate into the knee and hip joint where the skeletal/skeleton traction/extension could involve the aggravation of septic phenomena.

Besides the medical contraindications indicated, were contraindications also of tactical order/formation, somehow: the impossibility to transfer casualty in the shelter in the presence of the danger of the air attack of enemy, need for rapid evacuation into the rear, absence of the conditions, necessary for conducting the skeletal/skeleton traction/extension.

Combined treatment of the bullet of break of thigh by skeletal/skeleton traction/extension and by deaf gypsum bandage. From the materials of the deepened development of the histories of disease/illness it is evident that in the rear hospitals the treatment of bullet of breaks of thigh by skeletal/skeleton traction/extension was conducted predominantly in the combination with the gypsum bandage.

Skeletal/skeleton traction/extension by itself was used in those of the case when casualties were delivered into the hospital of the rear in the splints through 4-5 weeks from the moment/torque of wound, besides in the satisfactory condition.

Skeletal/skeleton traction/extension with the subsequent application of gypsum dressing was used in the hospitals of the rear

when casualties arrived within the early periods from the moment/torque of wound (on 2-3rd week) with the transport immobilization, which was observed during the first 2 years of war. In this case the skeletal/skeleton traction/extension was imposed for 30-45 days, and then they replaced by its deaf gypsum bandage.

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In the rear hospitals skeletal/skeleton traction/extension most frequently preceded deaf gypsum bandage, since the large part of the casualties with the bullet break of thigh entered from the preceding stages into the rear hospitals in the deaf gypsum bandage, having a displacement of broken ends.

Frequently skeletal/skeleton traction/extension put to use for the elimination displacement at angle, to the periphery and along the length, even if periods for this were missed. In a number of the cases by skeletal/skeleton traction/extension it was possible to remove the significant displacement of broken ends even within the late periods.

The periods of the stay of casualties in deaf gypsum bandage before the use/application of skeletal/skeleton traction/extension did not exceed usually 15-20 days.

After conducting the course of the treatment of the bullet break of thigh skeletal/skeleton traction, on the extremity was laid the deaf gypsum bandage, in which the casualty walked to the consolidation of break.

As the example of the use/application of a gypsum bandage after skeletal/skeleton traction/extensior can serve the following observation.

S.A.V., 24 years, is wounded 20/X 1942 by bullet right through into the left thigh. Medical instructor put bandage and sent casualty on the stretchers on PMP, where to him was superimposed wire splint. On DMP 21/X after splitting up of wound is superimposed the splint of Diterichs. 27/X in ^{Kh} PPG is superimposed deaf gypsum bandage, and 30/X casualty was evacuated but the front line evacuation hospital where he stayed to 7/XI 1942. Temperature always remained subfebrile. 14/XI 1942. Casualty arrived in the rear evacuation hospital. Condition of patient satisfactory, temperature of 37.8°.

Patient of correct build, satisfactory nourishment. From the side internal organs/controls there are no deflections from the norm. Urine and the blood without the changes.

Gypsum bandage is taken/removed. On the front face of upper third of left thigh is an inlet in size 1.5x1.5 cm, under the crust; on the posterior surface of thigh - longitudinal wound by the size/dimension 8x4 cm, carried out by granulations in covered with an insignificant quantity of pus. Is noted pathological mobility and displacement of broken ends along the length, width and at the angle, opened toward the front. Accordingly radiogram, extremity is shortened by 4 cm.

14/XI 1942 is superimposed to 45 days skeletal/skeleton traction/extension (8 kg. per thigh and 4 kg. to the shin). During the skeletal/skeleton traction/extension was conducted the complex treatment: dressing, physiotherapy, therapeutic gymnastics and the like 15/XII wound healed.

31/XII skeletal/skeleton traction/extension is taken/removed, is superimposed coxitis gypsum bandage with the stirrup p with 5/I 1943 to patient was solved walk with the aid of the crutches, attacking/advancing on patient. 19 I 1943 gypsum bandage is taken/removed and produced roentgenography. Movements in the joints are completely maintained, is probed the well formed strong/durable callus. Is noted the shortening of extremity on 1 cm. Are assigned

massage, therapeutic gymnastics. Patient first walked on the crutches, and then 27/I to 10/II put to use bacillus/rod. It is discharged 24/II 1943 in the satisfactory condition.

During the first year of war skeletal/skeleton traction/extension was used during 30-40 days, but subsequently these periods were extended to 45-50 days with the subsequent cleol traction/extension during 12-15 days. As a result sharply was shortened the need for the application of gypsum dressing after the removal/taking of traction/extension, with exception of the cases of the delayed education of the callus and osteomyelitic process.

Cleol and lykoplactic traction/extension as the independent method of the treatment of the bullet breaks of thigh was not conducted. Usually it was used in the subsequent stage by treatment after the removal/taking of skeletal/skeleton traction/extension. Cleol traction/extension did not provide the reposition of broken ends, since in these cases thrust is transmitted on the bone not directly, but through the soft tissues, but therefore is insufficient. Moreover, cleol traction thrust fails cargo above 4-5 kg., but for the thigh traction/extension by this cargo is clearly insufficient.

Cleol traction/extension could be used only sometimes when it

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was necessary to eliminate insignificant displacement at angle and in the width.

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From the materials of the deepened development of the histories of disease/illness it is evident that the Kleolov traction/extension was accepted only into 1.0c/c of cases with respect to other methods of the treatment of the bullet breaks of thigh. Sometimes Kleolov traction/extension was used after gypsum cast, and in the unit of the cases after short-time traction/extension again was laid deaf gypsum bandage. Kleolov traction/extension was not used with comminuted fractures with the significant damage of soft tissues, especially skin with subcutaneous cellular tissue, and with the insignificant displacement of bone broken ends.

Skeletal/skeleton traction/extension technique and care of casualties. At the beginning of the Great Patriotic War and in the USSR, and abroad was proposed a significant quantity of different instruments for the imposition of the skeletal/skeleton traction/extension: clip, nails, spokes, basic designation/purpose of which is rodding directly to the bone. These instruments had to satisfy the following requirements: the ease/lightness of conducting

through the soft ones of tissue and bone, durability with the significant load, absence both of the adverse effect on the soft tissues and difficulties during the removal/taking of skeletal/skeleton traction/extension.

According to personal observations in the Great Patriotic War for the skeletal/skeleton traction/extension into 90.00/o of cases used Kirschner wires, also, into 10.00/ - Pavlovich's clamp; in this case were necessary the following objects/subjects: the apparatus of the Moscow institute of traumatology and orthopedics, which consists of bur, wire, clip and key/wrench for the stretching of wire; the hinged splint with the units/blocks for the lower extremity, the bed (it is desirable on casters) with the wooden shield, zone from the flannel tissue, cleol, rubber or simple plugs, thick reps cords, narrow scalpel, shears and syringe, the locker of small size/dimension (30x30x15 cm) as foot rest, the delivery of Bardengeyer with the units/blocks, several units/blocks on the simple supports/sockets, clamp of Pavlovich, hammer.

For the realization of skeletal/skeleton traction/extension of Kirschner wires was conducted, depending on the level of break, either above muscles of thigh or through tuberosity of the tibia. With the breaks of thigh in upper third of proximal scraps of bone under the activity of an iliac-lumbar and buttock muscle it was

displaced forward and towards the outside, and extremital - towards the inside and upwards as a result of the thrust of the bringing muscles. Displacement for all diaphysic breaks of thigh was typical along the length, width and along the axis.

The same forms of displacement were observed with the breaks of thigh in middle third with the only difference that the the extremital broken end differed slightly toward the rear and towards the inside. In these cases for the creation of the best conditions of traction/extension in the direction in the knee joint. With the bullet breaks in lower third of thigh and especially about epicondylar breaks the extremital broken end of bone under the activity of thrust by fixed to muscles of the thigh sural muscle was sharply displaced toward the rear. This breaks frequently accompanied by the damage of muscles of thigh and knee joint. Skeletal/skeleton traction/extension in these cases was conducted by thrust for tuberosity of the tibia, moreover in by the avoidance of the displacement of peripheral broken end it is toward the rear profitable it was profitable to slightly bend foot in the elbow. Pavlovich's clamps used when it was possible to carry out thrust for the thigh. In view of the possibility of cutting and slide to draw by clamp for tuberosity of the tibia they avoided. For the skeletal/skeleton traction/extension the foot was stacked to the splint. At first the wars used Ecehler's splint. But this splint, and

splint of Braun, has many deficiencies: it does not make it possible to change the bearing/angle of the flexing of extremity in the hip and knee joint, it cannot be increased along the length of extremity, in it they are hindered/hampered both active and passive movements in the joints, as is known, the shown in the process treatments.

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To the war and in the period of the Great Patriotic War the very modern types of hinged splints for the treatment of the break of lower extremity were designed by V. D. Chaklin, A. M. Land, by the Sverdlovsk institute of orthopedics and traumatology, by P. B. Bogdanov et al.

We give below the short description of the designed in Urals two splints which in the rear hospitals sufficiently widely put to use during the treatment of bullet breaks the thighs.

1. Bogdanov's slipping splint for lower extremity (Fig. 161). The lower frame, fitted cut to the installation for the right and left leg, bears on itself the second frame with the pair of rails; this frame can be fixed/recorded on the archlike strut at angle to 30°. From the upper unit of this strut occurs the arc, which leans by

its other end on the high support/socket, heavily-supported to the lower frame. Branches of the thighs, by articulated with the rear end of the lower frame, are fastened with branches of shins also by hinge joint at the different level with respect to the length of the thigh of casualty. Branches of shin they have at the free ends rollers, which roll along the rails of mobile/motile frame. Packed on this system branches foot can be bent in the knee and hip joint (it is active), since the specific mobility of branches of shin on its rollers on the rails this completely allows/assumes. If there are no active movements in the joints still, then joints can be exercised passively: for this the knee bearing/angle of splint is suspended to the mobile/motile carriage of top camber, from the carriage is stretched the cord through the upper roller to the hand of the casualty who through carriage drives knee joint. Branches of splint they can be fixed, and on them it can be produced the ordinary skeletal/skeleton traction/extension of thigh and shin.

2. Splint VOSKHITO for the lower extremity of the Sverdlovsk scientific research institute of restorative surgery, traumatology and orthopedics (Fig. 162) is intended for functional treatment simultaneously with the traction/extension of shin and thigh (if this is necessary). The movement of branches of shin, that have with itself rails, occurs on the rollers, fastened/strengthened to any height on the front/leading frame of splint.

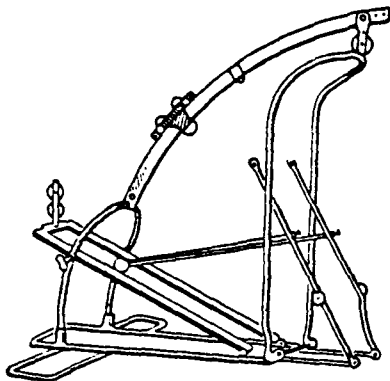


Fig. 161.

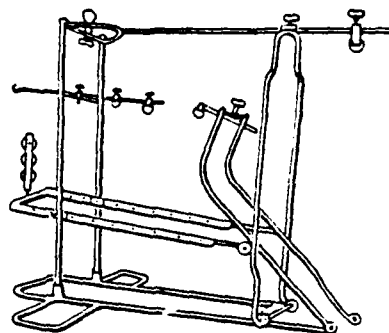


Fig. 162.

Fig. 161. Bogdanov's sliding splint.

Fig. 162. Splint VOSKhITC for lower extremity of Sverdlovsk scientific-research institute of restorative surgery, traumatology and orthopedics.

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The system of rollers for the direction of cords from the clamp of traction/extension, being it is attached in course and direction of traction/extension, allows/assumes to accomplish movements in the knee and hip joint, moreover the direction of cord from clamps and the position/situation of clamps are not changed, and clamp during

the movements of extremity does not traumatize tissues. Splint can be established/installed both for the right and for the left leg and with the use by it is not required augmented thrust and the frames of Braun or splint of Bogdanov, etc. Both active and passive movements extremities are accomplished via pulling by patient for the cord, which goes through the upper posterior roller to the knee bearing/angle of splint. The length of branches of thigh can be at will changed, and all branches they can be fixed as on Bogdanov's splint.

Technology the impositions of skeletal/skeleton traction/extension estimated as production in the aseptic operation/process. Traction/extension is produced as follows. After the full/total/complete medical processing of casualty they stack to the specially prepared bed with the shield and on the small wheels. Injured lower extremity is placed in Boehler's splint, after attaching to foot middle physiological position/situation, is lubricated by 100/o iodine liquid lower third of thigh, regions of the knee joint and upper third of shin and operating field they will border by sterile towels. While conducting of the spoke through the epicondylar region of thigh the surgeon stops from the side of the damaged extremity facing the casualty, by fingers/pins he grasps muscles of thigh and is determined retraction above muscles. After determining the point of the introduction of spoke, anesthetize skin

and the subject soft tissues to the bone in the places of insertion and removal of spoke 20-30 ml 0.5% solution of novocaine

Then with sharp/acute narrow scalpel is produced puncture to the bone from the face: by drill wire is conducted into the soft tissues and the bone in order to lighten the removal of spoke from opposite side, is made small section/cut at that place where the skin is stuck out by the conducted through the bone spoke. With the skeletal/skeleton traction/extensior for tuberosity from its tibia spoke conduct in the basis tuberosities on 1.5-2 cm toward the rear from its highest point. Technology the same as while conducting of wire above muscles even more easily, since the point of insertion and removal of wire to determine more simply. After conducting of the spoke through thigh or tuberosity of shin is fastened the arc of the Moscow institute of traumatology and orthopedics for the traction/extensions; in it consolidates and stretches by special key/wrench the spoke.

Pavlovich's clamp is laid on the thigh at the same points, as spoke. After the anesthesia of points the introductions of clamp make two punctures by narrow knife from the internal and face of thigh. Then are introduced branches of clamp to the bone and with the strikes/shocks of the wooden mallet from each side they alternately drive in them into the bone on 3-5 cm. After this consolidate set

screw the clamps and suspend cargo.

To the skeletal/skeleton traction/extension of thigh sometimes was added to the shin constant Kleolov traction/extension. Kleolov traction/extension was realized by zones from the flannel and by gauze bandages. Technology is such: the zone of flannel in wide in 5-6 cm they stuck from the head of fibular bone to external malleolus: it freely enveloped in the form of stirrup foot; it further occurred along inside of shin upward to muscle of the tibia. All this still they fixed/recorded with gauze bandage. In striving it was put in plywood plate by the size/dimension 6x4 cm with the aperture for the cord. To avoid sagging the feet they were suspended on a small hammock. The hour after the drying of clecl it was possible to already add cargo, also, for the shin. The size/dimension of cargo to the thigh and to the shin depended on the amount of the displacement of the period of break and power of musculature. On the average to the thigh was required the cargo in 8-12 kg, and to the shin in 2-4 kg.

Sometimes, in order to increase basic thrust for setting and retention of broken ends, was required an even lateral thrust. However, in the majority of the cases with the skeletal/skeleton traction/extension correct thrust along the axis of thigh with the large cargo removed need in the lateral thrust.

With the breaks of upper third of thigh the lateral thrust for the loop, which envelops proximal broken end, was realized in the medial direction by a cargo in 2-3 kg. With the breaks in lower third of thigh was sometimes required the pressure down on the proximal broken end. Lateral thrust were used only for eliminating the displacement in the width.

The removal/taking skeletal/skeleton traction/extension does not present difficulties, but in this case it is necessary to observe preventive measures against the infection of bone canal. The removal/taking technique skeletal/skeleton traction is such: after the removal/taking of arc was lubricated the skin around the spoke by iodine liquid as the medial unit of the spoke which was bitten off by cutting pliers in the most skin aperture: then, pulling by flat-jawed pliers for the remaining free end, spoke easily was removed, wounds on muscles of thigh were lubricated by the iodine liquid and were occluded by patch, which after 5-6 days could be removed/taken, since wounds healed.

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Finishing the section skeletal/skeleton of traction/extension

technique, should be emphasized one important detail - the need for before any shift/relief of traction/extension putting first Kleolov traction/extension. Skeletal/skeleton traction/extension according to the plan treatments replaced by Kleolov treatments, and from the corresponding readings/indications entirely they sometimes ceased traction/extension and changed to the gypsum bandage.

As the example of the use/application of Kleolov traction/extension of afterward skeletal/skeleton serves the following personal observation.

V. M. I., 26 years, is wounded 10/VII 1943 by the fragment of artillery shell into the left thigh. First aid is shown/rendered by the comrade who bandaged by first aid kit and immediately sent on the cargo motor vehicle on DMF, where during the same day was produced splitting up of wound, removed metallic foreign body by the size/dimension 1x1.5 cm was superimposed the splint of Diedrich, after which patient they sent in KhPPG, where 18/VII to it was superimposed deaf gypsum cocytis bandage.

From KhPPG 23/VII it was evacuated into the front line evacuation hospital where in it during 7 days was observed temperature of 38-39°. 2/VIII it was evacuated into the rear evacuation hospital, where it arrived 7/VIII. General condition of

patient satisfactory, temperature of 37.6°; tongue moist, the pulse of 84 strikes/shocks per minute. From the side of internal organs/controls there are no deflections from the norm. ROE 28 mm an hour, leukocytes 12000. Leukocyte formula without the deflections from the norm. In the urine the trails of protein.

Gypsum bandage is impregnated with pus. On the removal/taking of cast was determined pathological mobility in middle third of thigh. In the region of the external surface of left thigh on the boundary of upper and middle third is a granulating wound by the size/dimension 9x6 cm with abundant suppurative discharge, covered with flaccid granulation.

X-ray photograph in two projections. Taking into account that there is no fistula and that there is a large-splintered break with the large bone broken end, adjacent close to the proximal and extremital broken end of femoral bone, it was decided not to operate patient and not to remove bone broken end.

Is noted the shortening of extremity on 6 cm. Immediately 7/VIII 1943 is superimposed skeletal/skeleton, traction/extension with the cargo in 10 kg. to the thigh and in 4 kg. to the shin. Is assigned the complex treatment: dressing, physiotherapy, sulfanilamide preparations inward, therapeutic gymnastics. After 45 days

skeletal/skeleton traction is taken/removed and is superimposed Kleolov traction/extension to 15 days. 4/X is produced roentgenography of thigh. There is a good consolidation and a strong/durable corn. Wound healed by a good elastic scar. Extremity is shortened by 2 cm. 12/X it is solved to walk on the crutches. It is discharged 15/XI in good condition.

If spoke broke, it was necessary it to replace. Spoke changed immediately in order to prevent the reflector contraction/abbreviation of muscles and the secondary displacement of broken ends even, where the consolidation already occurred, but the callus still insufficiently got stronger, since least delay threatened to bring together on no effect of multiday traction.

Roentgenological supervision with the skeletal/skeleton traction/extension of the bullet breaks of thigh was absolutely necessary. For the general/common/total alignment it was possible to be restricted to roentgeroscopy, but the details of skeletal/skeleton traction/extension were inspected/checked only with the aid of the X-ray photograph.

For the X-ray photographs they put to use portable X-ray machine. The X-ray photographs of break were produced in two projections - lateral and front-posterior both before the imposition

of traction/extension and 1-2 days after it.

Roentgenological supervision was conducted also in the process of treatment usually after every 10 days. The first month photographs gave only repulsing the picture of the standing of the repositioned broken ends, and subsequently they made it possible to judge also reparative processes in the place of break, education of corn and degree of consolidation.

Casualties with the skeletal/skeleton traction/extension in order to ensure with them the proper care/departure, are placed in the individual wards and they fasten for the care of them specially trained average/mean and junior medical persona. The distance between the beds must be not less than 1 m from each side so that it would be possible to approach and to inspect the system of traction, but in the case of necessity and to establish support/socket for the lateral thrust.

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Patient is stacked on the shield above the separating flask, to simple without the sutures and the folds. To avoid bedsores the region of scapulas, loin, nates daily they wipe by camphor alcohol. Personnel must track so that with the report/event of urination and

defecation bed would not be soiled. Each cot must be secured with signalling for personnel's call. Person several times in the day inspects/checks the system of traction/extension and if notes deflections in the thrust, the position/situation of extremity and the malfunction of equipment, then it takes measures for debugging. Dress/lavatory and the shift/relief of linen is produced, not weakening traction and without permitting to patient to be turned sideways.

Complex treatment of the bullet breaks of thigh in combination with the skeletal/skeleton traction/extension. Complex treatment was conducted through the following plan/layout. After the arrival of casualty, subsequent medical processing, inquiry and his general/common/total examination/inspection they in detail became acquainted with the history of the disease/illness of casualty, comprised in the preceding stages. Produced roentgenoscopy of the organs/controls of chest and thigh, and also total analysis the blood and the urine. As a result of inspection/examination selected one or another method the treatments.

In the cases, shown to the skeletal/skeleton traction/extension, were taken following measures: after the removal/taking of gypsur bandage and additional medical treatment was planned the individual plan/layout of treatment. On the basis of the data of roentgenoscopy,

roentgenography and form/species of wound, first of all established/installed readings/indications to the secondary surgical processing, and then to the skeletal/skeleton traction/extension.

Reworking of the wound of the thigh before the imposition of skeletal/skeleton traction was produced into 52.00/o of cases. It consisted of the carving of granulation, Rubtsov, fistulas. Produced full/total/complete examination wounds, revealed flows, were removed the foreign bodies: bullet, the fragments of shells and mines, and also free at the wound and stuck in muscles and subcutaneous cellular tissue the bone fragments, which lost bond with the broken ends of thigh; after this wound they filled by streptocide and from the readings/indications were laid rare sutures on the skin. This operation/process was performed under the the local anesthesia with 0.50/o solution of novocaine or under the cerebrospinal anesthesia 3-4 ml 2-30/o solution of novocaine.

By conducting the Kirschner wire was completed surgical intervention; it produced assistant, participating in the surgical processing, or operator itself, but only after the replacement of gloves and smock.

When secondary surgical processing was not caused by need, after examination/inspection the wounds for it laid the appropriate bandage

and they changed to the skeletal/skeleton traction/extension.

Besides reworking of the casualties, treated by the method of skeletal/skeleton traction/extension, operated also within the later periods from the moment/torque the entries into the hospitals of the rear. General/common/total operability, on materials of personal observation, composed 83.00/o, including reworking of wounds was produced into 52.00/o of cases, sequestrectomy - into 23.00/o, amputation - into 2.00/o; arthroctomy - into 0.50/o, cystectomy - into 0.50/o; plastic operations/processes (carving of scar, the occlusion of skin defect) - into 5.00/o.

Based on materials of the deepened development of histories the diseases/illnesses, the operation/process (besides it is primary the treatment) with the bullet breaks of thigh, treated by skeletal/skeleton traction/extension occurred into 59.40/o of cases.

By the distribution of the casualties, operated in the process of treatment by skeletal/skeleton traction/extension, according to a number of made repeated operations/processes it was the following: one operation/process they transferred 53.10/o, two operations/processes - 28.20/o, three operations/processes - 11.70/o, four operations/processes - 4.50/o, five and more than operations/processes - 2.50/o.

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Among those treated by skeletal/skeleton traction/extension in 34.00/o of casualties were osteomyelitis, inspite of sequestrectomy, produced in their time through 7-8 weeks from the moment/torque of wound.

Amputations were produced into 2.00/o of cases apropos of the sepsis, which was not being supplied to radiation/emission. A comparatively small number of amputations is explained, on one hand, by the fact that in the heavy septic condition skeletal/skeleton traction was not used, but on the other hand, fact that during the first years of war the readings/indications to the amputation were excessively narrowed and then were produced only in limiting cases, sometimes even with the delay and only in 1943-1944 extremities began to amputate somewhat more frequently. Plastic operations/processes, as it is indicated, composed 5.00/o of all operations/processes of which significant majority composed the carving of the limply granulating wounds and reclining toward the ulceration/pitting Rubtsov with the imposition subsequently of suture; 1.20/o of these operations/processes fell to the transplantation of skin according to S. M. Yanovich-Chaysns and 0.60/o - to the free transplantation of

the perforated/punched skin using Yu. Yu. Dzhanelidze's method.

By the very essential unit of a functional-complex method of the treatment of the bullet breaks of thigh skeletal/skeleton traction/extension was therapeutic gymnastics. Of all forms/species of the latter main attention gave to the active movements under the control of methodologist the gymnastics.

From the second day after the imposition of skeletal/skeleton traction/extension began more active movements in the talocrural joint of wounded foot and in all joints of healthy/sound foot.

After 3-4 days of casualties began to train to pulse to the simultaneous contraction/abbreviation of all muscles the thighs, after 20-25 days to bend foot in the hip and knee joint in limits of 5-15°, without facilitating thrust. The displacement of broken ends in this case did not occur in view of the proper fixation by their operating traction/extension. From the 35-40th day performed more energetic the exercise to 30 times a day, increasing in this case the bearing/angle of flexing. For an improvement in the movement in the hip joint and simultaneously for strengthening of body and hands to casualties they proposed 30-35 days after the imposition of the skeletal/skeleton traction/extension of 5-10 times in the day to sit down itself in the bed for 2-3 minutes, pulling by hands for the

straps, attached to the back of bed.

After the removal/taking of skeletal/skeleton traction/extension followed the mechanotherapy for the development with aid of apparatus of movements in the joints.

Drugs appointed both locally to the wound and inward for the general/common/total activity on the organism. The wounds healed almost in all cases already in the second phase of the wound process when prevailed the phenomena of dehydration.

Wounds during this period bandaged predominantly with A. V. Viwnyovskiy's ointment. With abundant suppurative discharge were laid the bandages with the hypertonic solution of common salt. Extensively were used bandages with the acidophilic lactate paste.

For dealing with the infection and for increasing the general/common/total reactivity of organism they put to use sulfanilamide preparations: sulfide, by sulfazole, by streptocide, that were being used as it is local, so also inward, by the intravenous pouring in 40c/o glucose, that alleviate pain (morphine, pantopon), cardiac, etc. were fairly often produced also transfusion the blood by small doses - on 200-250 ml after 3-5 days, casualties gave fish oil, infusion of sweetbrier, pine needles, the extracts and

other preparations of vitamins A, B, C and D.

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Based on materials of the deepened development of the histories of disease/illness, were only unitary observations of the treatment of complications of the wound process of the bullet breaks of thigh by penicillin, usually in combination with sulfanilamides with the aggravation of osteomyelitis, in the septic condition, suppurative flows, etc. Penicillin was introduced by patient after surgical intervention intramuscularly at the dose of 100000-150000 units in a 24 hour period during 7-10 days. Its activity was exclusively effective.

Was noted an improvement in the health of patient, sleep, appetite, temperature fell lytically, and sometimes also critically, pulse became fuller/more total/more complete rare; a quantity of pus was decreased, granulation was revived.

The hospitals of the rear had the capability to widely put to use therapeutic nourishment; for the basis were taken hospital ration and products of secondary economies, which made it possible to diversify food. To patients was given the worthy table, rich in vegetables and by milk products in the form of cheese, cottage

cheese, brynza, sour milk and acidophilic milk.

In the general/common/total complex with the skeletal/skeleton traction/extension were conducted physical methods of treatment, which contributed to active hyperemia in the wound, to reinforcing of local immunity and immunobiologic reactions of organism.

In the first period irradiation by erythematous doses into 3-5 biodoses by mercury-vapor lamp underwent the arranged/located proximally from the wound sector of skin of thigh in 400-600 cm².

Frequently pains in the place of break after this ceased.

Together with the segmental irradiation was produced ultraviolet lighting of the limply granulating wounds. A good activity exerted in such cases the illumination of the sector of the break and entire thigh with sun lamp of 1-2 times in the day.

For accelerating the resorption of infiltrates were used all forms/species of electrotherapy - diathermy, the currents of ultra-high frequency, iontophoresis and electroplating but especially widely practiced the so-called non-mechanical physiotherapy - mud-peat-paraffin- and the clay treatment.

However, the mud cure they began from the first days after the removal/taking of traction/extension into purposes of thermal effect loading both on the spot of its application and in the adjacent sectors. To the callus, to the hip and knee joint mud applications of the temperature in 40-42° were laid for 20-30 minutes, and then their temperature was finished to 45-47°. The course of treatment on the average consisted of 15-20 procedures, and sometimes and of 30. As a result of mud cure sufficiently rapidly was improved the general condition of casualty, were resolved infiltrates, were softened scars and was decreased difficulty of movement of joints.

With the great success the prolonged deep heating of tissues was achieved by hot local applications of the potter's clay. The procedure of clay applications the same as mud.

The significant and prolonged heating of tissues was achieved also by paraffin/kerosene applications.

Clinical outcomes. The duration of the healing of wounds with the bullet breaks of thigh and the periods of the occlusion of fistulas depended on the degree of the damage of soft tissues, and also on the conditions for the formation of the callus and coursing of the complications of osteomyelitis. The periods of healing of the wounds of soft tissues with the bullet breaks of thigh, treated by

skelatal/skeleton traction/extension, based on materials of personal observations, are represented in the following form: wound healed during 30 days into 5.0c/o of cases in coursing of 60 days - into 14.0c/o, during 90 days - into 35.0c/o, during 120 days - into 18.0c/o, during 150 days - into 11.0c/o, during 180 days - into 9.0c/o of cases. Fistula was not closed up to the moment/torque of extraction in 8.0c/o the cases.

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Thus, more than in half of all cases of wound they healed in the course of 3 months.

Based on materials of personal observation, the consolidation of the bullet breaks of thigh, treated by skeletal/skeleton traction/extension, occurred within different, as a result of the different reasons, periods, but on the whole to 6 months from the moment/torque of wound all breaks, with exception 1.0c/o, grew together themselves.

The periods of the treatment of casualties with the bullet break of thigh, treated by skeletal/skeleton traction/extension and by gypsum bandage, before the education of strong/durable callus and to the extraction from the hospital, they are shown in Table 191.

Comparing the indicators of the periods of treatment and degree of the shortening of thigh (Table 192), it is possible to note that in the group of those treated skeletal/skeleton traction/extension they were considerably higher than the indicators of the group of those treated by deaf gypsum bandage. Thus, treatment by skeletal/skeleton traction/extension gave the best indicators, although they did not finally yet solve the advantages of one form/species of the immobilization over another.

Table 191. Distribution of casualties with the bullet break of thigh, treated by skeletal/skeleton traction/extension and by gypsum bandage, according to the periods of the beginning of walking and extraction (in the percentages) (based on materials of personal observation).

(1) Раненые	(2) Срок лечения (в месяцах)							
	2	3	4	5	6	7	8	
(3) Начали ходить без костылей:								
леченные скелетным вытяжением	2	38	48	8	5	1	—	100
леченные гипсовой повязкой	—	18	32	22	18	7	3	100
(4) Выписаны из госпиталя:								
леченные скелетным вытяжением	—	3	38	48	8	2	1	100
леченные гипсовой повязкой	—	—	23	34	28	9	6	100

Key: (1). Casualties. (2). Period of treatment (in months). (3). They began to walk without crutches. (4). treated by skeletal/skeleton traction/extension. (5). treated by gypsum bandage. (6). They are discharged from hospital.

Table 192. Shortening of lower extremity after the recovery of the bullet break of thigh (in the percentages) (based on materials of personal observation).

(1) Укорочение до начала лечения (в см)	(2) Укорочение после лечения (в см)												
	(3) скелетным вытяжением						(6) Итого	(4) гипсовой повязкой					
	0	2	3	4	5	6 и более		0	2	3	4	5	6 и более
3	-2.0	—	—	—	—	—	22.0	14.0	6.0	5.0	—	—	25.0
4	—	16.0	2.0	—	—	—	18.0	—	12.0	12.0	4.0	—	28.0
5	—	1.0	13.0	2.0	—	—	25.0	—	—	16.0	6.0	—	22.0
6—8	—	6.0	6.0	4.0	1.0	—	17.0	—	—	—	6.0	2.0	8.0
9—10	—	4.0	3.0	2.0	2.0	—	11.0	—	—	—	—	12.0	12.0
11 и более (5)	—	—	—	2.0	2.0	3.0	7.0	—	—	—	—	5.0	5.0
(6) Итого	22.0	36.0	24.0	10.0	5.0	3.0	100.0	14.0	18.0	33.0	16.0	14.0	100.0

Key: (1). shortening prior to the beginning of treatment (in cm).
 (2). Shortening after treatment (in cm). (3). by skeletal/skeleton
 traction/extension. (4). by gypsum bandage. (5). and more. (6).
 Altogether.

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Are given below, based on materials of the deepened development of the histories of disease/illness, the data about the degree of shortening of extremity with the extraction from the hospital after the treatment of the bullet breaks of thigh by different forms/species of therapeutic immobilization (Table 193).

During the use/application of skeletal traction/extension, according to these data, was observed a smaller number of shortenings, rather than during the treatment by gypsum bandage,

i.e., there is a coincidence of the given above materials of the personal observation of the author with the data of the deepened development.

Clinical outcomes in casualties with the bullet break of the thighs, represented Table 194, gives taking into account the use/application of a method of therapeutic immobilization, i.e., are separately examined outcomes in those treated by skeletal/skeleton traction/extension and in casualties, treated by deaf gypsum bandage. The materials of the deepened development and personal observation also are given to the individuality.

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Table 193. Therapeutic immobilization and shortening with the bullet break of thigh (in the percentages).

(1) Лечебная иммобилизация	(2) Укорочения в см									Всего
	1	2	3	4	5	6	7	8	9	
(3) Скелетное вытя- жение	4,5	15,9	17,4	18,2	17,6	12,4	6,2	2,4	7,4	100,0
(4) Глухая гипсовая повязка	2,6	11,2	18,3	18,2	18,3	15,5	8,4	2,9	4,6	100,0
(5) В среднем	3,0	12,2	18,0	17,9	17,8	14,7	8,0	2,8	5,6	100,0

Key: (1). Therapeutic immobilization. (2). Skeletal/skeleton traction/extension. (3). Gypsum bandage. (4). data to bearing/angle (feudatory development). (5). observation of author.

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Table 194. Clinical results of bullet fractures of the thigh with treatment by skeletal traction and plaster-of-Paris bandage in percents .

(6)	(1) Вид лечения	(2) Предпочтительные методы		(3) Вид лечения	
		(4) Скелетная тяга	(5) Гипсовый бандаж	(6) Скелетная тяга	(7) Гипсовый бандаж
Клинические результаты					
(8) Хороший анатомический и функциональный результат		72	48.5	82	100
(9) Деформация		1.2	1.8	1.2	0
(10) Повреждение нервов		1.1	8.2	0.8	0
(11) Контрактура		1.9	4.1	0	40.0
(12) Анкилоз		1.3	2.7	0	0
(13) Ложный сустав		1.4	1.8	0	0.4
(14) Потеря конечности		0	2	0	0
(15) Остеомиелит		0	3.9	0	8.0
(16) Прочие		2	0	0	6
(17) Комбинация кроме потери конечности и прочих		9.9	1.0	0	1.0
(17) Итого		100.0	100	100.0	100.0

Key: (1). Type of treatment. (2). Skeletal traction. (3). Plaster-of-Paris bandage; (4). data from in-depth workup. (5). Author's observations. (6). Clinical results. (7). Good anatomical and functional result. (8). Deformation. (9). Nerve damage. (10). Contracture. (11). Ankylosis. (12). False joint. (13). Loss of extremity. (14). Osteomyelitis. (15). Other. (16). Combination of (except for loss of extremity and other). (17). Total.

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With analysis of the given materials of the deepened development it is impossible to establish/irstall sharp difference in the outcomes between the groups of the casualties, treated by least types of bandage and by traction/extension. Then one should say, also,

relative to the group of personal observations; however if we compare the results of personal observations with the results of the deepened development, then almost according to all indicators advantage will be on the side of data according to the personal observations. In some subjects the method of skeletal/skeleton traction/extension gave the best results, than in others, which conducted treatment by skeletal/skeleton traction/extension, possibly, without so thorough a selection such as could produce the author.

Is characteristic for the materials of the deepened development and author's observation smaller lethality and smaller frequency of amputations during the treatment to traction/extensions in comparison with the treatment by deaf gypsum bandage.

During the comparative evaluation of the methods of the treatment of the bullet breaks of thigh by deaf gypsum bandage and by skeletal/skeleton traction/extension it is necessary to consider that both the method has its positive and negative sides, and for that, and for another method there were their of reading/indication and their of contraindication.

It is necessary to also have in mind that the skeletal/skeleton traction/extension was independently used very rarely, and it was usually combined with the treatment by deaf gypsum bandage. Therefore

the given above comparative data on the outcomes in casualties, treated by deaf gypsum bandage and by skeletal/skeleton traction/extension, do not characterize the very methods of treatment as much they as give presentation/concept about the distribution of the outcomes of breaks, treated those or by another method.

Thus, skeletal/skeleton traction/extension in casualties with the bullet break of thigh during the Great Patriotic War was used into 13.10/o of cases, besides mainly in the combination with the deaf gypsum bandage.

In 75.00/o of cases skeletal/skeleton traction/extension was applied as a result of the complication of wound process of infection, in 20.0 %/o - as a result of the incorrect standing of broken ends and into 5.00/o - on other reasons.

By most modern for the treatment of the bullet breaks of thigh skeletal/skeleton traction/extension were the hinged splints of domestic manufacture - splint of Bogdanov, Landa and Sverdlovsk scientific research institute of orthopedics and traumatology. The splints of Boehler and Braun became obsolete and did not satisfy all requirements of conducting skeletal/skeleton traction/extension.

Most frequently skeletal/skeleton traction/extension with the

bullet breaks of thigh was used during 45-50 days with the subsequent Kleyer traction/extension during 12-15 days.

According to the personal observations, before the imposition of skeletal/skeleton traction/extension into 52.00/o of cases was performed reworking of wound; furthermore, into 31.00/o during the skeletal/skeleton traction/extension were produced from different readings/indications additional operations/processes.

In 4.50/o of cases of the bullet breaks of thigh, treated skeletal/skeleton traction/extension, produced the amputations of thigh (deepened development).

Acceleration to 1 cm is obtained into 4.50/o of cases, to 2 cm - into 15.90/o, to 3 cm - into 17.40/o, to 4 cm - into 16.20/o, to 5 cm - into 17.60/o, to 6 cm - into 12.40/o and more than 6 cm - into 16.00/o.

Pseudarthrosis with the bullet breaks of thigh, treated by skeletal/skeleton traction/extension, were formed more frequently (1.90/o) than during the treatment by gypsum bandage (0.50/o).

Contractures and difficulty of movement of joints with the bullet breaks of thigh, treated by skeletal/skeleton traction/extension, using the personal materials, were observed in hip joint into 35.00/o, and in the knee - into 73.00/o, including the sharply pronounced contractures in the hip joint in 13.0 %, and in by elbow joint into 28.00/o; contractures in both joints simultaneously were observed into 8.00/o.

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Chapter IV.

BULLET BREAKS OF THE BONES OF SHIN.

Characteristic of anatomical changes with the bullet breaks of the bones of shin.

The corresponding member of the Academy of medical Sciences of the USSR Professor Colonel Medical Service A. N. Maksimenkov.

General/common/total characteristic.

All bullet wounds of shin decompose into two basic groups, different in their clinical course and outcomes: wound with the damage of bones 43.70/o and wound without the damage of bones 56.30/o.

During the analysis of the frequency of breaks of both bones of shin it is necessary to have in mind that in a number of cases by the wounding shell was damaged only tibia, whereas the break of fibula was sometimes the result of the incidence/drop in the man at the

moment of wound.

From a number of all breaks of the bones of shin in the fraction of the tibia it is 45.7o/o, fibular - 23.8o/o and both bones - 30.5o/o.

The distribution of the breaks of the bones of shin according to the level of wound was not equally (Table 195).

Consequently, among the isolated/insulated breaks of the tibia and fibular bone most of all was them in middle third and least of all in the upper, and among breaks of both bones most of all was breaks lower third.

The breaks of the bones of the shins, which penetrate into the joint, most frequently were observed in upper (10.0o/o) and lower (8.4o/o) third and most rarely on the average (0.4o/o); in average/mean 6.9o/o.

Table 195. Distribution of the breaks of the bones of shin according to the level of wound (in the percentages).

(1) Название кости	(2) Треть			(6) Две трети	(7) Всего
	(3) верхняя	(4) средняя	(5) нижняя		
(8) Большеберцовая . .	27,7	40,0	29,6	2,7	100,0
(9) Малоберцовая . . .	17,5	43,9	36,6	2,0	100,0
(10) Обе кости	18,3	32,6	44,6	4,5	100,0
(11) В среднем . . .	22,4	38,8	35,8	3,0	100,0

Key: (1). Name of bone. (2). Third. (3). upper. (4). average/mean. (5). lower. (6). Two thirds. (7). In all. (8). Tibial. (9). Fibular. (10). Both bones. (11). On the average.

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According to the form/species of the wounding shell all wounds of shin decomposed into two basic groups: bullet - 45.7o/o and fragmentation - 54.3o/o.

The relationship/ratio of the bullet and fragmentation wounds of shin is different depending on whether was damaged only one bone or both bones together. If we accept all bullet breaks of the tibia for 100, then among them bullet composed 51.6, and fragmentation - 48.4. Approximately/exemplarily also relationships/ratios were observed

also with the bullet breaks of the fibular bone where bullet composed 49.5, and fragmentation - 50.5.

Completely others data were encountered in the cases of the wounds of shin, which were being escorted/tracked by break of both bones where in the fraction/portion of fragmentation ones it was necessary to 65.00/o, and in the fraction/portion of bullet ones - only 35.00/o. Consequently, bullet breaks of both bones of shin were more frequently the result of fragmentation wounds. If one considers that the fragments, which caused the simultaneous break of two bones of shin, were are sufficiently great, then it is possible to visualize the degree of the damage of soft tissues.

The character/nature of the bullet damages of the bones of shin is manifold (Table 196).

65.40/o of all bullet breaks composed the heaviest forms of breaks - fragmented and crushed. Given data attest to the fact that almost into 2/3 all wounds of knee, which were being escorted/tracked by the break of bones, were observed the heavy damages of soft tissues.

The relationship/ratio of the individual forms/species of the bullet breaks of the bones of shin was different with the through

ones, the blind ones and the tangents of wound. Thus, large-splintered breaks with perforating wounds of both bones of shin composed 39.90/o, with the tangents - 33.30/o, with the blind ones - 44.80/o.

Here attention is drawn to the fact that among the blind-end wounds almost in half of the cases were observed the large-splintered breaks. Above it was indicated, that breaks of both bones of shin in the overwhelming majority of the cases were the result of fragmentation wounds; therefore the high percentage of large-splintered breaks of both bones of shin among the blind-end wounds one cannot fail to connect with the striking power of the wounding shell. If the assumed is founded upon basis, then it is logical to expect that the relationship/ratio of the crushed breaks will be conversely to the relationship/ratio of large-splintered ones. Actually/really, among through wounds of shin with damage of both bones the crushed breaks were observed into 35.20/o, among the tangents - into 40.00/o, and among the blind ones - only into 23.60/o of cases.

table 196. Distribution of the bullet and fragmentation wounds of shin according to the form/species of break (in the percentages).

(1) Вид перелома	(2) Вид ранения		(5) В среднем
	(3) пулевое	(4) осколочное	
(6) Крупнооскольчатый	41,3	28,0	34,1
(7) Раздробленный	14,2	29,9	22,7
(8) Краевой	14,5	15,6	15,1
(9) Мелкооскольчатый	10,0	7,5	8,6
(10) Косой	9,4	7,8	8,6
(11) Дырчатый	7,4	7,7	7,5
(12) Поперечный	2,1	2,4	2,3
(13) Продольный	0,9	0,9	0,9
(14) Включенный	0,2	0,2	0,2
(15) Всего	100,0	100,0	100,0

Key: (1). Form/species of break. (2). Means of wound. (3). bullet. (4). fragmentation. (5). On the average. (6). Large-splintered. (7). Crushed. (8). Edge/boundary. (9). Small-splintered. (10). By sand bar. (11). Perforated. (12). Cross. (13). Longitudinal. (14). Packed in. (15). In all.

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Oblique and fine(ly)-fragmented breaks of both bones of shin almost equally frequently were encountered with the blind ones, with the through ones, and with the tangential wounds. So for example, the oblique breaks in the group of blind-end wounds composed 8.90/o, in the group of through ones - 8.90/o, and in the group of tangents - 6.70/o.

Were here examined the relationships/ratios of the individual forms/species of breaks of both bones of shin with different character/nature of its wounds. But the given relationships/ratios to the known degree were changed in the cases of the isolated/insulated breaks of the individual bones of shin, as is evident from Table 197.

From the preceding information it is evident that the large/coarse and small-splinter breaks of each of the bones of shin most frequently were encountered with the perforating wounds.

The edge/boundary breaks of the tibia were encountered considerably more frequent than the edge/boundary breaks of fibular bone, in all forms of the wound of shin, moreover they most frequently were observed in the group of tangential wounds.

Comparing the oblique breaks of each of the bones of shin with the tangential wound, it is possible to see that in the first place was found the fibular bone. The latter is partially explained by anatomical building/structure.

The high percentage of the perforated breaks of the tibia is explained also by the peculiarities of its building/structure (see

below).

In connection with the fact that the surgical anatomy of the described above individual forms/species of the bullet breaks of the bones of shin is different, will be examined below each form/species of break and its special feature/peculiarity in combination with the damage of other anatomical education of shin.

Table 197. Distribution of the bullet breaks of the individual bones of shin according to their form/species in the dependence on the character/nature of wound (in the percentages).

(1) Характер ранения голеши	(2) Наименование кости	(3) Вид перелома							(10) Всего
		(4) крупно- и мелкоосколь- чатый	(5) краевой	(6) носовой	(7) раздроблен- ный	(8) диаметраль- ный	(9) поперечный и продоль- ный		
(11) Слепое	(12) Большеберцовая	29,2	28,5	9,5	5,7	23,5	3,6	100,0	
	(13) Малоберцовая	52,5	18,6	9,5	8,8	6,8	3,8	100,0	
(14) Сквозное	(12) Большеберцовая	46,6	20,6	10,9	9,0	10,3	2,6	100,0	
	(13) Малоберцовая	63,0	11,5	8,5	10,7	2,0	4,3	100,0	
(15) Касательное	(12) Большеберцовая	35,8	44,0	6,7	7,5	4,5	1,5	100,0	
	(13) Малоберцовая	53,5	16,3	11,6	9,3	2,3	7,0	100,0	

Key: (1). Character/nature of the wound of shin. (2). Designation of bone. (3). Form/species of break. (4). large/coarse and small-splintered. (5). edge/boundary. (6). by sand bar. (7). crushed. (8). perforated. (9). cross and longitudinal. (10). In all. (11). Blind. (12). Tibial. (13). Fibular. (14). Through. (15). Tangent.

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Large/coarse and small-splintered breaks of the bones of shin.

It is above, in Table 196, it was shown that the large-splintered breaks of the bones of shin were observed into 34.10/o all of its wounds with the break of bones, and small-splintered composed 8.60/c. Of given above data it is possible to also see that the large/coarse and small-splintered breaks both of both bones of shin and each individually composed the greatest group with the blind-end, perforating and tangential wounds.

Level of breaks. In the common picture of the surgical anatomy of the large/coarse and small-splintered breaks of the bones of shin damage level has vital importance.

The separate units of the tibial and fibular bone - diaphysis and metaphysis - in view of the special features/peculiarities of their anatomical building/structure (compact and coarse substance of bone) were damaged differently. The level of the break of bone determined the larger or smaller possibility of damaging the adjacent

joints.

The analysis of data of the deepened development of the histories of disease/illness from this point of view showed that the large/coarse and small-splintered breaks in the overwhelming majority of the cases were encountered in middle and lower third, as is evident from Table 198.

In these data one is struck by the fact that the greatest percent of large fragment wounds fall within wounds of each bone in the middle third of the knee; in second place is the lower third, and in third - the upper, in view of which breaks of the large thigh bone more frequently involve the knee-foot (11.7%) than the knee (9.7%) joint.

Wound canals. The general/common/total structure of the wound canals of the bullet wounds of shin with damage to one or both bones was different, depending on the level of wound, the form/species of the wounding shell, its direction and character/nature of the wounds of shin. Will be examined below the morphological special features/peculiarities of wound canals with the perforating, blind-end and tangential wounds of shin, which were being escorted/tracked by the large/coarse and small-splintered breaks of bones, depending on moments/torques indicated above. It is here necessary to note that the wound canals of shin, as a rule, almost

never were rectilinear, which depended, on one hand, on the anatomical-physiological special features/peculiarities of the damaged tissues of shin, from the position/situation of extremity at the moment of wound, and also on the displacement of bone broken ends, especially with breaks of both bones of shin.

Table 198. Frequency of comminuted fractures of the bones of shin in connection with the level of damage (in the percentages).

(1) Наименование кости	(2) Вид перелома	(3) Уровень перелома по третям			(7) Сочетание уровней
		(4) верхняя	(5) средняя	(6) нижняя	
(8) Большеберцовая	Крупнооскольчатый (9)	23,2	43,1	34,0	49,3
(11) Малоберцовая	Мелкооскольчатый (10)	3,9	5,3	8,5	5,6
	Крупнооскольчатый (9)	29,9	44,4	42,7	37,1
	Мелкооскольчатый (10)	14,5	18,7	21,0	22,2

Key: (1). Designation of bone. (2). Form/species of break. (3). Level of break on third. (4). upper. (5). average/mean. (6). lower.

(7). Combination of levels. (8). Tibial. (9). Large fragment. (10). Small-splintered. (11). Fibular.

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Furthermore, the zone of damage to shin never was limited only to the place of the direct damage of the tissues of knee by the wounding shell, since contusion and concussion of tissues apply to significant distance from the wounding shell (I. V. Davydovskiy, A. V. Smol'yannikov).

Perforating wounds. With the perforating wounds of shin with the damage of bones on the course of the wounding shell it is possible to separate two different ones in its building/structure of the department of the wound canal: to the place of break and after the

place of the break of bones or bone.

The first has relatively simple building/structure whose special features/peculiarities to a certain extent depend on the form/species of the wounding shell. The second is characterized by the special complexity of building/structure, connected with the fact that the wounding shell, which comminuted bone, not only carries off after itself its fragments, but also communicates to them the unit of its kinetic energy, in consequence of which the latter acquire the character/nature of secondary shells and damage tissue equal with the wounding shell. Fragments pierced soft tissues in the different directions, in consequence of which the zone of the direct damage of tissues in the second department of wound canal sharply was increased. It is logical that, depending on the level of the break of the bones of shin and direction of the wounding shell, the decomposition of soft tissues was different. Thus, with the wounds in middle third of shin where all muscles of shin have the greatest volume, perforating wound they were especially heavy.

The topography of individual muscular groups on the shin differs in terms of some special features/peculiarities in the sense that they unevenly encircle the bones of shin (Fig. 163).

As can be seen from Fig. 163, in the posterior department of

shin is arranged/located the bulk of muscular tissue, in its front/leading and anteroexternal department less and in a front-the internal it completely is absent.

In light of that presented with the perforating wounds of shin acquires special importance the direction of the wounding shell. All perforating wounds of shin with the damage of the bones can be divided into two basic groups, with which the structure of wound canal and, consequently, also the degree of the damage of the integrity of the soft tissues of shin will be different: sagittal and frontal.

Sagittal wounds in turn, decompose into two special from the point views of the surgical anatomy of the group: front- posterior and rear-front.

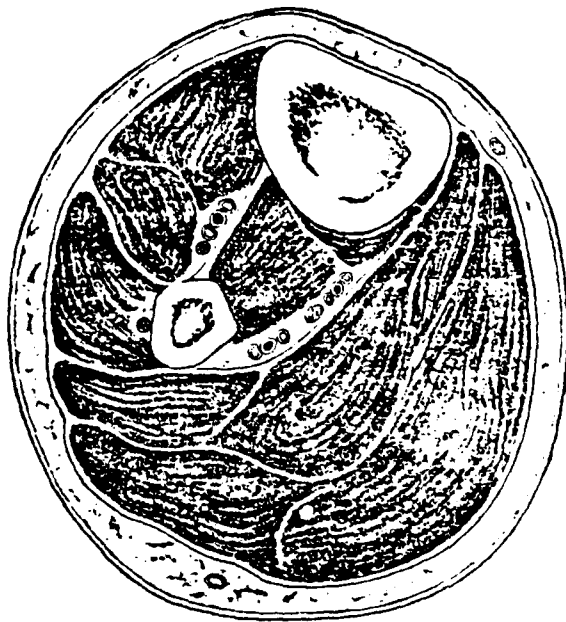


Fig. 163. Horizontal cut of shin according to N. I. Pirogov.

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With the sagittal front-posterior perforating wounds of shin the wounding shell pierces the tissues of shin from the front back/ago; the first department of wound canal (to the place of break) has insignificant length. But if the wounding shell penetrates anterointernal than the surface of the shin where between the skin and the tibia muscular tissue is absent, then in the essence the first department of wound canal is absent. The second department of wound canal with these wounds is especially complex, since the

wounding shell and the fragments of bone pierce and destroy the basic muscular mass of shin, namely *m. tibialis posterior*, *m. flexor digitorum communis longus*, *m. flexor hallucis longus*, *m. soleus* and *m. gastrocnemius* (Fig. 164).

The degree of the violation of the integrity of the named muscles is directly proportional to value and to a quantity of fragments of bone. As the example it is possible to give the following observation.

The date of wound is not known. Diagnosis is the perforating bullet wound of middle third of right shin. Preparation No 2397.

On the sagittal cut of right shin is visible the break of the tibia in middle third. Edges broken ends sharp/acute, notched. Between the broken ends - two bone fragments in long in 6 and 5 cm, also with the sharp edges. Bone marrow of proximal broken end on 3 cm from the level of the break of dark brown color, with the phenomena of fusion.

In the X-ray photograph of internal half of shin after the sagittal cut (Fig. 165) is visible the large-splintered break of the tibia. The fragments of bone are arranged/located toward the rear from the diaphysis. Evidently significant decomposition of the posterior group of the muscles of shin. On the course of wound canal

are from the front back/ago in the destroyed muscles visible the bone and metallic fragments of different sizes/dimensions, the penetrating soft tissues of shin in the posterior department.

With the sagittal posterior-front/leading perforating wounds the decomposition of the soft tissues of shin is expressed considerably weaker, since the most developed muscles of posterior department are damaged only by wounding shell, whereas the broken ends of the bones, which acquire the character/nature of secondary shells, damage relatively insignificant by their volume muscles of the front/leading and anteroexternal department of shin (■ tibialis anterior, ■ extensor digitorum communis longus, ■ extensor hallucis longus, ■ peroneus longus et brevis) (Fig. 164).

As the example it is possible to give the following observation.

Wound 17/XII 1942 the amputation 24/XII 1942. Preparation No 3062. Perforating bullet wound in middle third of left shin. Multifragment break of large thigh bone.

In the X-ray photograph (Fig. 166) is visible the large-splintered break in middle third of the tibia and far propagated crack. In the gastrocnemius muscles there are fine/small bone fragments. On the sagittal cut, carried out through the place of

wound (Fig. 167), is evident the hemorrhage in the region of wound, which penetrates into the spongy substance of epiphysis. Furthermore, are visible fine/small hemorrhages in the thickness of gastrocnemius muscle, in particular, a soleus. Is noted significant hematoma, which is located in a muscular-fascial slit between a soleus and deep plate of its own fascia of shin.

The degree of the decomposition of muscles in a posterior-front/leading direction of the wounding shell varies depending on the level of break, namely the wounds of upper and middle third of shin differ from wounds lower third, where all muscles changed into their tendons and where, therefore, muscular tissue actually is absent.

With the frontal perforating wounds of shin, independent of the direction of the wounding shell, the soft tissues of the shin of the front/leading and anteroexternal department of shin suffer in the identical measure and mainly due to value and form of bone broken ends.

Page 456a.

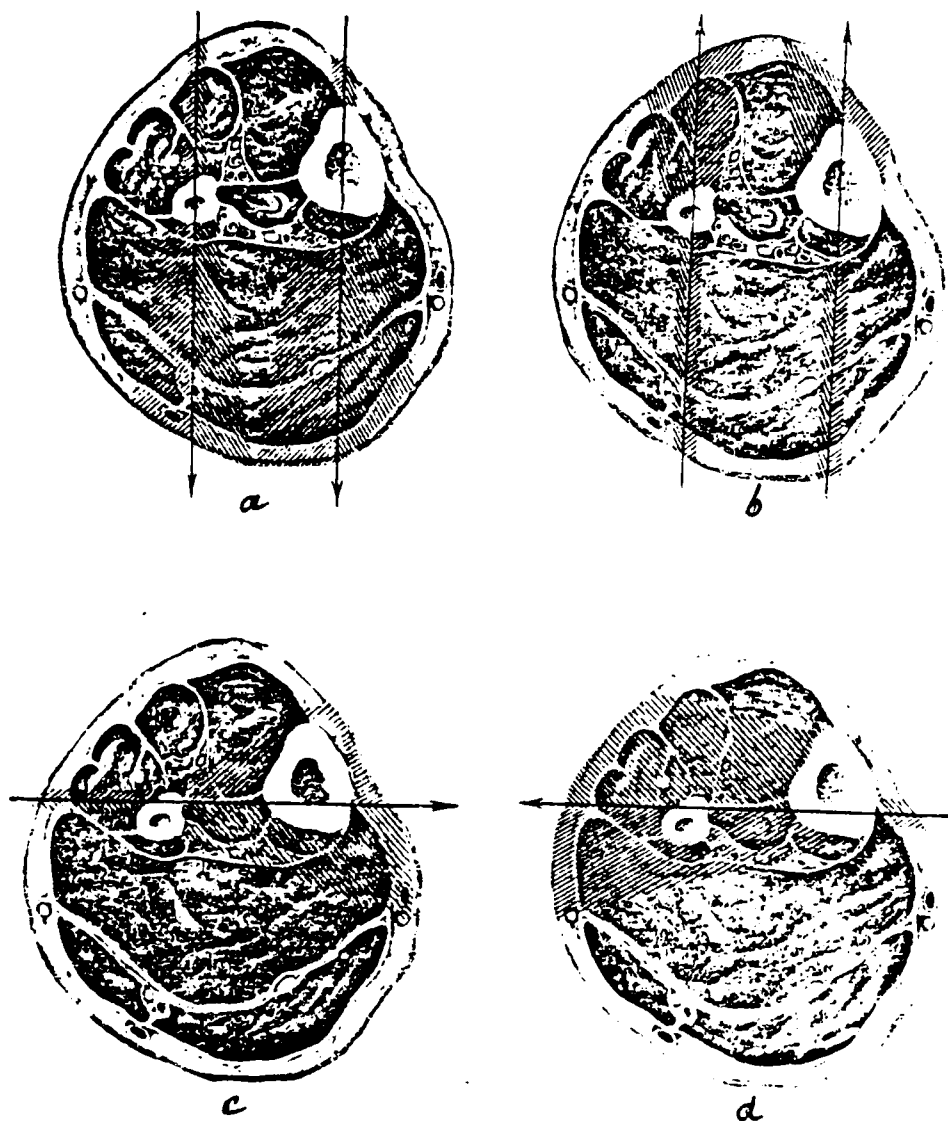


Fig. 164. Topography of damages of soft tissues of shin with its perforating sagittal and frontal wounds in middle third. a) the zone of the damage of soft tissues with the perforating front- posterior

wounds; b) the zone of the damage of soft tissues with the perforating posterior-front/leading wounds of shin; c) the zone of the damage of soft tissues with the perforating outward-internal wounds; d) the zone of the damage of soft tissues with the perforating inward- external wounds.

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Fig. 165.



Fig. 166.

Fig. 165. Front- posterior sagittal perforating wound of right shin in middle third (X-ray photograph from internal half of shin after sagittal cut. Preparation No 2397).

Fig. 166. Posterior-front/leading sagittal perforating wound of shin.

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Large-splintered break of the tibia (X-ray photograph from preparation No 3062).

Page 456c.



Fig. 167. Sagittal cut of shin. Preparation VMM No 671/3062. (Artist of T. V. Belyayev.)

Page 456d.



Fig. 168.

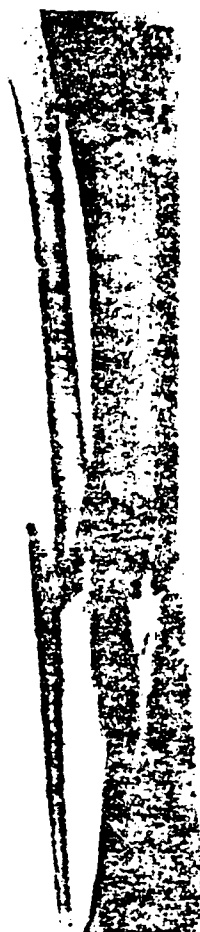


Fig. 169.

Fig. 168. Frontal cut of right shin (preparation No 4134/680).

Fig. 169. Frontal perforating wound of right shin in middle third
(X-ray photograph from preparation No 4134/690).

Page 456e.



Fig. 170.



Fig. 172.

Fig. 170. Blind-end bullet wound of shin with damage to tibia (X-ray photograph from preparation No 63944/3790).

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Fig. 172. Blind-end fragmentation wound of shin with damage of bones
(X-ray photograph from preparation No 2432/729).

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With the frontal perforating wounds is raised the possibility of damaging the neurovascular bundle, which is explained by the topography of vessels and nerves. With this means of wounds, as a rule, these anatomical education proves to be in the zone of wound canal.

As the example of frontal wound it is possible to give the following observation.

Wound 8/III 1942 death 12/III 1942. Preparation No 4134/680.
Diagnosis: the perforating wound of middle third of right shin with damage of both bones.

On the internal surface of middle third of shin irregular the wound by the size/dimension 9x14 cm. Edges and the bottom of wound uneven. In the depth of wound are visible the broken ends of the damaged bones.

On the frontal cut of shin, produced through the region of wound canal, is visible the complexity of its structure (Fig. 168). Attention is drawn to the displacement of bones along the length, in

consequence of which the axis of canal is broken. On the course of canal are visible the fragments of bones and the damaged soft tissues.

Is noted hemorrhage into bone marrow and into the spongy substance of bone. Hemorrhage applies to significant distance from the axis of canal both in the proximal ones and in the extremal broken ends.

On roentgenogram (Fig. 169) is visible multifragment break of both bones of shin; broken ends, both proximal, and extremal, have uneven ends. In the soft tissues are visible bone fragments.

Besides moments/torques indicated above, the complexity of structuring the wound canal with the perforating wound of shin to a considerable extent depended on the character/nature of the wounding shell, its form, sizes/dimensions and kinetic energy.

Bullet perforating wounds of shin. Depending on distance, on which the bullet pierces the tissues of shin, the surgical anatomy of perforating wounds is different. In the zone of explosive/bursting action of bullet (distance to 1000 m) both with the sagittal ones and with frontal wounds both departments of wound canal sharply are distinguished. In such cases the department of wound canal to the

place of break, as a rule, is straight-line, and the decomposition of soft tissues is insignificant (see below); whereas the department of canal after the place of the break of bone with the bullet wounds is characterized by irregular form, sharp damage of the integrity of soft tissues, including skin. In such cases frequently are formed the defects of soft tissues, sometimes significant sizes/dimensions.

Degree of the decomposition of the tissues of shin depends also on the rebounding of bullet, its rotations. Thus, sometimes bullet, penetrating in the tissue by the tapering point strikeing against the bone of shin, changes its direction, and sometimes also form. After the place of the break of bone the bullet pierces soft tissues, having already changed (in comparison with the original) its direction.

In the zone of contusion (from 2000 to 4000 m) with the bullet wounds of shin, even with large fragment breaks, is observed the smaller decomposition of soft tissues and, apparently the smaller displacement of bone fragments.

Fragmentation perforating wounds of shin. The surgical anatomy of the fragmentation perforating wounds of shin is considerably more different than bullet ones. This is mainly the result of the fact that the form and the value of fragments (fragments of artillery

shells, min, etc.) is too different.

In a number of cases, especially with the single fragmentation wounds when the value of fragment does not exceed the size/dimension of bullet, to determine in appearance of entrance and outlet the character/nature of the wounding shell was impossible. Surgical anatomy with such fragmentation wounds is almost identical bullet.

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In these cases the department of wound canal to the place of break also is not characterized by special complexity, whereas the department of wound canal after the place of break has the same special features/peculiarities, as with the bullet wounds (see above).

Completely another picture is observed with the wounds by large fragments. In such cases wound canal and to the place of break, and after it has exclusively irregular form, what is the direct consequence of size/dimension and form of the fragments, which call the significant decomposition of the muscles of shin, especially posterior department (■ soleus, ■ gastrocnemius, etc.).

With the fragmentation wounds more frequently are formed the

large defects of tissues with the heavy decomposition of bones at the significant distance.

With the perforating fragmentation wounds of shin are frequently visible multiple wounds. In such cases actually there is a combination of perforating and blind-end wounds. The surgical anatomy of such wounds is especially complex. Here soft tissues not only are damaged by the incorporated bone broken ends, but also are pierced in the different directions by the metallic fragments whose unit stuck in the soft tissues, but unit passed right through. With such wounds the region of the direct damage of the tissues of shin can be very significant.

Finally, in the picture of the surgical anatomy of the perforating wounds of shin it is necessary to consider the secondary shells, introduced in the tissue of shin by bullets and fragments (unit of the foot-wear, clothing, and also the small pieces of concrete, the fragments of granite, etc.).

Blind-end wounds. With the blind-end wounds the general/common/total structure of wound canal is different. One their basic factors, which are determining these differences, is the depth at which the shell penetrates in the tissue. In this case it is possible to distinguish the following cases: the wounding shell,

which caused the break of bone, stops on the spot of break, the wounding shell changes further for the place of break and stops in the soft tissues at the larger or smaller distance from the surface of shin.

In the first case building/structure of wound canal to the place of break in no way differs from that described above with the perforating wounds. However, in the second case, as with the perforating wounds, is presently (after the place of break) a second department of wound canal; however the latter it has its essential differences. With the straight-through wounds the second department of wound canal (after the place of break) is characterized by the larger or smaller defect of the soft tissues, pulled out by the left the tissues shell and the fragments of bone (education of infundibulum). With the blind-end wounds in the canal after the place of break forms a larger or smaller quantity of secondary blind wound canals (formed by the fragments of bone, by the units of wounding shell, etc.). If we in this case consider that the frequently wounding shell ricochets in the tissues, is changed its direction, then the anatomical complexity of the second department of wound canal with the blind-end wounds of shin becomes clear. From that presented it is evident that the thicker the layer of soft tissues on the route/path of the wounding shell after the place of break, the more complex the surgical anatomy of such wounds. Therefore all

blind-end wounds in a front-posterior sagittal direction of shell, especially in upper and lower third of shin, have complex surgical anatomy. In such cases the muscular mass of the posterior bed of shin (group of long flexors, a soleus and a gastrocnemius) proves to be pierced in the different directions by blind wound canals.

In a posterior-front/leading direction of the wounding shells (with the sagittal wounds) the surgical anatomy of the region of wound is considerably simpler (see perforating wounds).

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With the frontal blind-end wounds the structure of wound canal the more complex, the deeper in the tissue penetrated the wounding shell, the greater the bone broken ends and the nearer the level of wound to middle third of shin.

Bullet blind-end wounds. In the description of the perforating bullet wounds of shin was turned the attention in the special feature/peculiarity of wounds by bullets. With the bullet blind-end wounds it is necessary to indicate that, depending on changes in the position/situation of bullet, or the degree of its strain and decomposition, from rebounding and direction, the surgical anatomy of the blind-end wounds of shin will differ in terms of larger or

smaller complexity, moreover the zone of direct damage, its extent, will be determined by the degree of the decomposition of bone (Fig. 170).

Fragmentation blind-end wounds of shin. With the blind-end fragmentation wounds, especially multiple, in the region of one or the other segment of shin it is possible to observe different in the severity decomposition of the soft tissues which in the identical measure suffer both from the wounding shell (shells) and from the fragments of bone. On the presence of the multiple, going in the different directions blind canals, which contain different in their nature foreign bodies is conditioned the complexity of the surgical anatomy of this means of wound. In these cases it is difficult to speak about the wound canal and it is more right, it would seem, to speak about the zone of wound canals. As the example it is possible to give the following observation.

Wound 30/XII 1941 death 1/I 1942. Preparation No 2432/729.

Diagnosis: the fragmentation wound of left thigh in upper third with the damage to bone. Fragmentation wound of left shin in middle third with the damage to bone. Anaerobic infection.

Preparation: the frontal cut of left shin (Fig. 171). Is visible break of both bones. The place of break has it is many bone fragments

in long from 1 to 4 cm.

Edges fragments and broken ends sharp/acute, uneven, bone marrow of the broken ends of dark/nonlustrous, almost black color (sectors of hemorrhage), muscle dark brown.

On the external surface of shin is a suppurative wound by the size/dimension 7x7 cm, dirty red-brown color with the even sharp edges, covered with suppurative impositions. In the center of wound will stand the bone broken end of the tibia.

Pathoanatomical diagnosis: fragmentation wound with multifragment break of both bones. Multiple hemorrhages into bone marrow of broken ends and into the muscles. Anaerobic infection.



Fig. 171. Frontal cut of left shin (preparation No 2432/729).

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In the X-ray photograph is visible multifragment break of both bones in middle third of left shin, with the lateral displacement of broken ends at the angle, opened towards the outside (Fig. 172). At

the level of the break in the soft tissues are visible metallic fragments with size/dimension from 0.1x0.1 to 0.5x1 cm.

Tangential wounds. The tangential wounds of shin with the violation of the integrity of bones in the frequency occupied latter/last place among all bullet bullet breaks of shin, composing only 2.00/o, and among the fragmentation ones - 5.00/o. By the given indicators is determined the practical value of this means of wounds.

The surgical anatomy of the large/coarse and small-splintered breaks of the bones of shin with the tangential wounds is less complex. The latter is determined by the fact that in this group the breaks of the bones of shin are the result of the lateral activity of the wounding shell, and therefore broken ends are not scattered on the course of wound canal. Building/structure of the departments of wound canal to the place of break and after it little is distinguished. The degree of the damage of soft tissues is determined mainly by the form/species of the wounding shell.

The wound canals of bullet wounds are different, depending on the topography of wound canal. With the bullet tangential wounds of the external periphery of shin is damaged mainly the group of weak muscles (peroneus longus and brevis). Sometimes, if bullet passes on the anteroexternal periphery, suffers front/leading group of

muscles (■ tibialis anterior, ■ extensor hallucis longus and ■ extensor digitorus communis longus).

Are most complex in this respect the tangential wounds of the posterior periphery when suffer ■ soleus, ■ gastrocnemius and the group of long flexors. Petit tangential wounds more frequently met the large/coarse and small-splintered breaks of fibular bone (53.50/o), than the breaks of tibia (35.80/o).

Fragmentation tangential wounds. With the tangential fragmentation wounds of shin, which are escorted/tracked by the break of bones, the decomposition of soft tissues was more heavily than with the bullet ones. Depending on size/dimension and forms of fragment, in the soft tissues is formed the greater, the smaller the size/dimension the defect on bottom of which it is possible to see the broken ends of bones; sometimes with the insignificant inlet it is possible to observe the significant decomposition of soft tissues in the outlet. Wound canal in such cases has the series/number of pockets and complex form. It is logical that, depending on the level of wound, the structure of wound canal will be different, in accordance with differences in the topography of muscular and tendinous tissue.

Crushed breaks.

The crushed breaks, which relate actually to the very heavy damages, composed 22.70/o of all bullet breaks of the bones of shin.

If we examine the crushing of the bones of shin from the point of view of the form/species of the wounding shell, then it appears that the crushed breaks among all bullet wounds composed 14.20/o, and among all fragmentation ones - 29.90/o.

The degree of crushing, extent the violations of the integrity of tibial and fibular bone tell to the known degree about the fact that kinetic energy of the wounding shell must be high.

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The relationship/ratio of spongy and compact substance in the fibular and tibia defined to a certain extent the frequency of this form/species of the break, depending on its level, as is evident from Table 199.

From the given indicators it is evident that the crushed breaks of the tibia most frequently were observed in the region of the diaphysis whose compact substance is subjected to crushing more than

spongy. Crushing of both bones and fibular more frequently was observed in upper third.

The greatest frequency of crushed breaks of both bones of shin in upper third is explained by the anatomical special features/peculiarities of building/structure of this unit of the shin. It is here small muscular tissue; bones are surrounded in essence by tendons, fascia, cellulose and skin, in consequence of which kinetic energy of the wounding shell almost completely is expended/consumed on overcoming of the obstacle, exerted by the bones of shin.

Since crushed breaks of both bones of shin most frequently are encountered with the wounds upper third, then it is possible to expect that into the zone of wound more frequently it must be drawn in knee than talocrural joint.

Wound canals. It is above, in the description of the large/coarse and small-splintered breaks of the bones of shin, is given the general/common/total characteristic of wound canals. It is here necessary to note that with the crushed breaks the structure of wound canal is still more complex, since the zone of the direct damage of tissues by the wounding shell is frequently significant.

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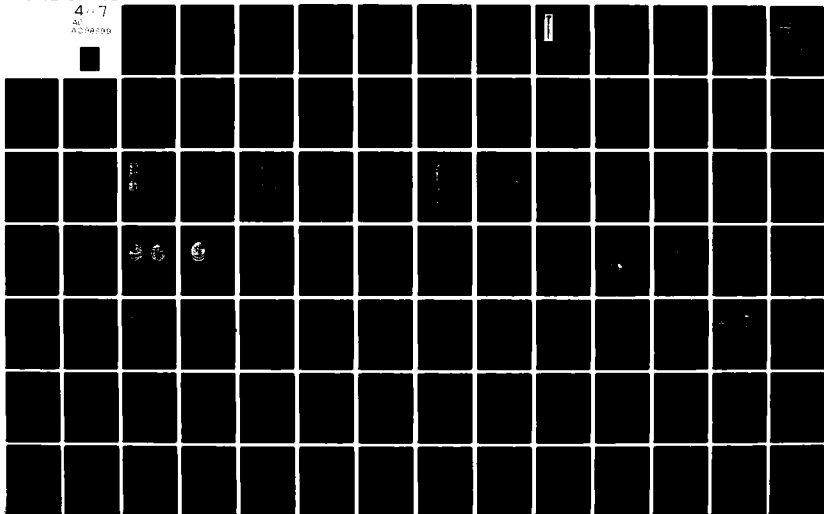
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With the crushed breaks in the department of wound canal to the place of the damage of bones and especially after the place of break are noted the decomposition of soft tissues, directly proportional of the degree of the damage of bones. It is logical that the wound canals will be different, depending on direction, the form/species of the wounding shell and character/nature of the wounds of shin.

Perforating wounds. Crushed breaks of both bones of shin composed 35.20/o among other breaks of the same bones with the perforating wounds.

With the sagittal front- posterior perforating wounds, with the the rear-front, and equal mode and with the frontal ones in the identical measure suffer soft tissues and, therefore, the zone of their damage is characterized by large extent and complexity of the structure of wound canal.

Bullet and fragmentation wounds (if fragment is single) differ little from each other. Wound canals are similar. In the practice, being guided by the examination/inspection of wound, not always it is possible to solve a question about the form/species of the wounding shell.

Table 199. Frequency of the crushed breaks of the individual bones of shin in connection with the level of wound (in the percentages).

(1) Наименование кости	(2) Уровень ранения по третям			(6) Сочетание уровней.
	(3) верхняя	(4) средняя	(5) нижняя	
Большеберцовая (7) . . .	7,7	8,8	7,6	14,1
Малоберцовая (8) . . .	11,7	10,8	8,8	18,5
Обе кости (9)	57,7	44,5	55,3	45,0

Key: (1). Designation of bone. (2). Level of wound on third. (3). upper. (4). average/mean. (5). lower. (6). Combination of levels. (7). Tibial. (8). Fibular. (9). Both bones.

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The crushed breaks of the individual bones of skin with the perforating wounds were encountered rarely. Thus, with the perforating wounds, accompanied by the fracture of the tibia, comminuted fractures are only 9.0%, and fibular - 10.7%.

Blind-end wounds. Comminuted fractures of both shin bones among other breaks of these bones with the blind-end wounds they were encountered they relatively frequently and composed 23.60/o. Consequently, almost into 1/4 all breaks of both bones with the blind-end wounds of shin was observed heavy decomposition of bones. But if we consider that the blind-end wounds more frequent were fragmentation, then it is possible to visualize the complexity of wound canals and the degree of the decomposition of soft tissues.

The crushing of the individual bones of shin with the blind-end wounds was encountered relatively rarely. Thus, among the blind-end wounds, which were being escorted/tracked by the violation of the integrity of the tibia, the crushed breaks were encountered into 5.7%, and fibular bone - into 8.8%. The high frequency of the crushed breaks of fibular bone it can be explained by peculiarities of its topography and the finer structure.

Tangential wounds. Crushing of both shin bones in the case of tangential wounds was encountered among other fractures in 40.0% of the cases. Such a high percentage may be explained by the frequency of fragmentation wounds. Based on this, it is possible to expect the heavy damages of soft tissues.

The crushing of individual bones with the tangential wounds was encountered more rarely. Thus, among the tangential wounds, which were being escorted/tracked by the break of the tibia, the crushing of the latter composed only 7.5c/c, and fibular - 9.3o/o. The higher percentage of a crushing-fibular bone here can be explained by its topography and more fine structure.

Edge/boundary breaks.

Among other forms/species of the breaks of the bones of shin edge/boundary were encountered relatively rarely. They composed only 15.1o/o, i.e., occupied the third place in the frequency.

The edge/boundary breaks of the bones of shin almost equally frequently were encountered both with the bullet ones (14.5o/o) and

with fragmentation wounds (15.60/o).

The level of wound little affected the frequency of edge/boundary breaks (Table 200).

From the given indicators it follows that the edge/boundary breaks of the bones of shin most frequently were encountered in upper and lower third.

Table 200. Frequency of the edge/boundary breaks of the individual bones of shin in connection with the level of wound (in the percentages).

(1) Наименование кости	(2) Уровни перелома по третям			(6) Сочетание уровней
	(3) верхняя	(4) средняя	(5) нижняя	
Большеберцовая (7)	30,4	20,2	25,0	9,9
Малоберцовая (8)	21,0	11,2	12,5	11,1
Обе кости (9)	2,5	2,1	1,2	2,5

Key: (1). Designation of bone. (2). Level of wound on third. (3). upper. (4). average/mean. (5). lower. (6). Combination of levels. (7). Tibial. (8). Fibular. (9). Both bones.

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As the example of the edge/boundary break of the tibia is given the following observation.

The date of wound is not known. Preparation No 2040/1866.

Pathoanatomical diagnosis: the blind-end fragmentation wound of middle third of right shin with the damage to the tibia.

In middle third of posterior surface of the tibia edge/boundary defect with the uneven edges by the size/dimension 6x1 cm. Marrow

area is opened (Fig. 173) .

With roentgenography is discovered the edge/boundary break of the posterior edge of middle third of diaphysis of right tibia with the defect of the bone substance with its size/dimension 6x1 cm. The outlines of defect even, sharp, with exception of the sector of external edge in extent in 1 cm, where the outlines are uneven.

Wound canals with the edge/boundary breaks of the bones of shin are not characterized by special complexity. A quantity of fragments and their sizes/dimensions are usually small, in consequence of which the decomposition of soft tissues on the course of the wounding shell after the place of break is expressed considerably weaker than with the described higher forms/species of breaks. Canals are different depending on level and character/nature of wound.

Perforating wounds. Edge breaks of both bones of shin with the perforating wounds were encountered relatively rarely, composing with respect to the remaining forms/species of breaks only 2.10/o; whereas the edge/boundary breaks of the individual bones they are encountered considerably more frequent. Thus, edge/boundary of break of the tibia among the perforating wounds of shin with the break of this bone composed 20.60/o, and fibular - 11.50/o.

Blind-end wounds. Edge/boundary breaks of both bones of shin with this means of wounds were encountered rarely and among the breaks of other forms/species composed 4.20/o.

The edge/boundary breaks only of fibular bone with the blind-end wounds composed 18.60/o, and the tibia - 28.50/o. The relatively high frequency of the breaks of the tibia is explained it by surface position and by building/structure (triangular form).

According by this, obtained as a result of the deepened development of the histories of disease/illness, edge/boundary breaks of both bones of shin with the tangential wounds were not at all encountered, whereas the edge/boundary breaks of individual bones were observed relatively frequently, especially tibia, and they composed 44.00/o of all breaks with the tangential wounds. The breaks of fibular bone composed 16.30/o. Attention is drawn to in this group the high percentage of the edge/boundary breaks of the tibia in comparison with the fibular.

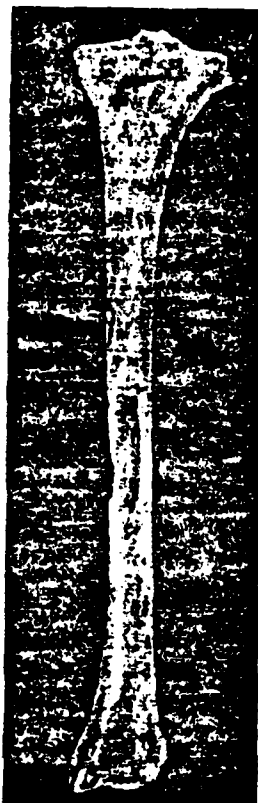


Fig. 173. Edge/boundary break of the tibia (preparation No 2040/1866) form/species from posterior-internal surface.

Perforated breaks.

The perforated breaks of the bones of shin among the remaining forms/species of breaks stood in the sixth place and composed 7.50/o. They almost equally frequently were encountered both with the bullet ones (7.40/o) and with the fragmentation (7.70/o) wounds.

The frequency of perforated breaks was changed depending on the level of the wound of the bones of shin. Thus, among all breaks of bones of shin in middle third they were encountered only into 4.60/o, in the upper - into 15.00/o and in lower third - into 6.50/o. In this respect is manifested the value of building/structure of bones, namely: perforated breaks more frequently were encountered in the limits of pineal systems and metaphyses, i.e., where predominates spongy substance (Table 201).

From Table 201 it is evident that most frequently the perforated breaks of the tibia were encountered in upper third.

As the example of the perforated break of upper third of the tibia with the blind-end bullet wound it is possible to give the following observation.

Z. is wounded 5/I 1944 diagnosis after the entry: the blind-end bullet wound of upper third of left shin with the damage to the tibia. 7 Hours after wound on DMP was produced the primary surgical processing of wound.

17/II is produced roentgenography: is discovered the perforated break of the tibia with the education of fine/small bone broken ends and longitudinal cracks of significant length. In bone, in the wound

canal evidently foreign body (deformed bullet) (Fig. 174).

19/II operation/process. Under ether anesthesia (100 ml) is produced the section/cut over the internal surface of upper third of left shin, moreover was secreted an abundant quantity of pus. Raspatory isolated periosteum of the tibia. Chisel cut off the damaged pieces of bone. In the depth of bone is discovered and removed the deformed bullet. Is produced the examination of wound. Contra-aperture on the posterior surface, in this case also was secreted pus. Into the sections/cuts are introduced two tampons with A. V. Viwnyovskiy's ointment. Is superimposed gypsum cast. Further course is favorable.

31/III roentgenography. In upper third of the tibia is determined the violation of integrity (incomplete break). Sequester is not evident. There are no metallic bodies.

1/VIII, i.e., 7 months after wound, patient is discharged into the unit with the completely healed wound and with the full/total/complete reduction of function both in the knee and in the talocrural joint.

In the given history of disease/illness turns to itself attention the strain of bullet and its rotation, which occurred,

apparently to the wound.

The character/nature of the wound of shin affects to a certain extent the frequency of the described form/species of the breaks of bones.

Table 201. Frequency of the perforated breaks of the individual bones of shin in connection with the level wound (in the percentages).

(1) Наименование кости	(2) Уровень перелома по третям			(6) Сочетание уровней
	(3) верхняя	(4) средняя	(5) нижняя	
Большеберцовая (7) . . .	22,7	8,4	13,8	7,0
Малоберцовая (8) . . .	5,6	1,9	3,5	3,7
Обе кости (9)	2,8	0,4	1,2	—

Key: (1). Designation of bone. (2). Level of break on third. (3). upper. (4). average/mean. (5). lower. (6). Combination of levels. (7). Tibial. (8). Fibular. (9). Both bones.

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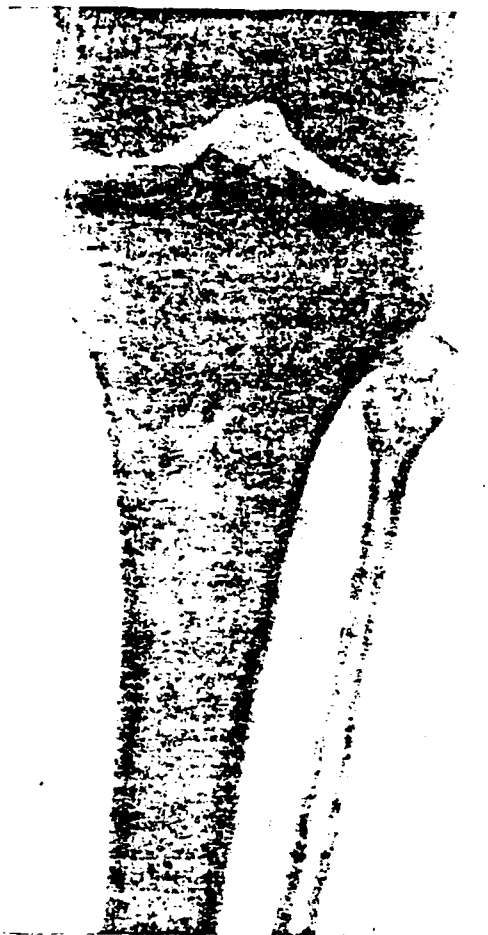


Fig. 174.

Fig. 174. Perforated break of tibia with deformed bullet in bone (wounded Z.).

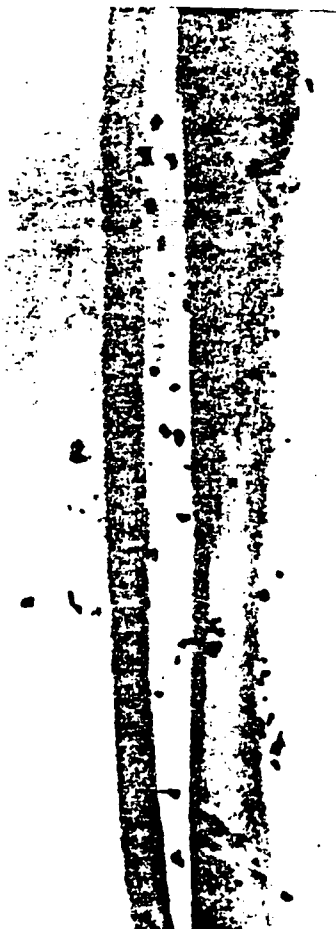


Fig. 175.

Fig. 175. Multiple blind-end fragmentation wounds of right shin with

dual break of tibia (X-ray photograph from preparation No 3742/3662).

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Thus, among all blind-end wounds of shin with the break of bones perforated composed 15.9c/o, among the through ones - only 5.7o/o, and among the tangents - 3.3o/o. Consequently, perforated breaks more frequently were observed with the blind-end wounds.

The surgical anatomy of the wounds of shin with perforated break of one or both bones of shin is not characterized by complexity. This form/species of breaks more frequently was observed with the blind-end wounds, in this case at the moment of damage to bone barely it is formed the fragments, which have the value of the secondary wounding shells; the wounding shells, as a rule, were small sizes/dimensions; therefore the structure of wound canal both to the place of the break of bone and after it (with the perforating wounds) it differed little by the degree of the decomposition of soft tissues. Since this form/species of breaks more frequently was observed in the limits of lower and upper third, where the muscular tissue it is considerably less than on the average, wound canal, as a rule, it approached rectilinear and did not contain pockets.

Oblique breaks.

The oblique breaks of bones of shin with its bullet wounds comprised among all other breaks 8.60/o. They almost equally frequently were encountered both with bullet wounds (9.40/o) and with the fragmentation ones (7.80/c) .

The level of wound to a considerable degree affects the frequency of this form/species of break (Table 202) .

The oblique breaks of the tibia more frequently were observed with the wound in middle third, of fibular with the wound in upper third, while oblique breaks of both bones were encountered equally frequently both in the upper and in middle third.

From the comparison of the given indicators it is possible to draw the conclusion that the oblique breaks of the tibia frequently were encountered with the wound in middle third, in this case it is necessary to consider that with the isolated/insulated break of the tibia at the moment of the incidence/drop in the casualty breaks the fibular bone. In such cases the mechanism of the break more frequently conditioned the onset of the precisely oblique breaks of fibular bone.

Taking into account the physical special features/peculiarities of the compact and spongy substance bone tissue, it is possible to expect that the oblique breaks must frequently be encountered in the region of the diaphysis of the bones of shin.

The frequency of oblique breaks in the various forms of the wounds of shin was not characterized by diversity.

Table 202. Frequency of the oblique breaks of the individual bones of shin in connection with the level of wound (in the percentages).

(1) Наименование кости	(2) Уровень ранения по трети			
	(3) верхняя	(4) средняя	(5) нижняя	(6) сочетания уровней
Большеберцовая (7)	8,2	11,1	10,7	11,3
Малоберцовая (8)	12,1	9,3	6,7	7,4
Обе кости (9)	7,1	7,0	5,8	3,7

Key: (1). Designation of bone. (2). Level of wound on third. (3). upper. (4). average/mean. (5). lower. (6). combination of levels. (7). Tibial. (8). Fibular. (9). Both bones.

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Blind-end wounds. Among the blind-end wounds, which were being escorted/tracked by break of both bones, oblique composed 8.9o/o. However, the oblique breaks of fibular bone composed 9.5o/o.

Perforating wounds. With the perforating wounds with the break of the bones of shin oblique breaks composed 9.6o/o, in this case the oblique breaks of the tibia composed 10.9o/o, fibular - 8.5o/c and both - 8.9o/o.

Tangential wounds. Oblique breaks of both bones of shin with the tangential wounds composed 6.7o/o, the tibia also 6.7o/o, and fibular

- 11.60/o.

From the comparison of the given above indicators it is evident that in all forms of the wounds of shin the oblique breaks of the bones of shin were observed almost equally frequently. Turns to itself attention a somewhat high percentage of oblique breaks of fibular bone, that it is possible to explain by topography and by structure.

Wound canals. The aforesaid above about the wound canals and about the direction of the wounding shell in the equal measure relates also to the oblique breaks. The special feature/peculiarity of the latter is an increase in the zone of direct damage to bone. The latter fact contributes so that in the zone of canal are included the slits, as a rule, carried out by the blood, between the slantwise arranged/located broken ends. Sometimes sharp/acute bone broken ends to a considerable degree damage soft tissues, in consequence of which the structure of canal acquires particularly complex form.

Cross, longitudinal and are packed in breaks.

The group of the described breaks of the bones of shin among all other forms/species occupied modest place, only 3.40/o, the cross breaks composing 2.30/o, longitudinal - 0.90/o and those packed in -

0.20/o.

These forms/species of breaks equally frequently were encountered both among the bullet ones and among the fragmentation wounds of shin, which were being escorted/tracked damage of bones. Among the bullet wounds they composed 3.20/o, while among fragmentation 3.50/o. Most rarely were observed the packed in breaks. Both the media of bullet ones and among the fragmentation wounds they were observed into 0.20/o.

The level of wound differently was manifested the distributions of the individual forms/species of the dismantled group of breaks of third. In this respect the vital importance has a question, is damaged one or both bones. Thus, for instance, cross breaks of both bones of shin equally frequently were encountered in lower and middle third (2.70/o), considerably less frequent they were encountered in upper third (0.70/o).

Somewhat different relationships were observed during the damage of individual bones (Table 203).

From given in Table 203 data it is evident that the longitudinal breaks of fibular bone were encountered mainly in upper and lower third and it is very rare - on the average. The cross breaks of the

same bone also most frequently were encountered in upper and lower third.

The longitudinal breaks of the tibia most frequently were encountered in upper third. Special position occupied the cross breaks of the tibia which most frequently were revealed in middle third.

The isolated/insulated packed in breaks of the individual bones of shin were observed very rarely and only tibia.

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Different frequency of the cross and longitudinal breaks of the individual bones of shin is explained by both the mechanism of wound and by special features/peculiarities of topography and building/structure (pineal system, diaphysis).

The character/nature of the wound of shin insignificantly affects the frequency of cross and longitudinal breaks. Cross and longitudinal breaks of both bones of shin among the blind-end wounds occupied very small place and composed only 4.20/o. The isolated/insulated cross and longitudinal breaks of the tibia among the blind-end wounds with the break of this bone composed 3.60/o, and

fibular - 3.80/o.

Among the blind-end wounds from a practical point of view one should secrete the group of the breaks, where the violation of the integrity of bones is the result of damage by the not so much not wounding shell, as by strike/shock of blast.

As the example of this means of wound it is possible to give the following observation.

The date of wound is unknown. Preparation No 3742/3662.

Pathoanatomical diagnosis. Break of the tibia of right shin and the fusion of soft tissues. Anaerobic infection.

On the front face of right shin is visible the surgical processed wound with the smooth skin edges, which goes from the knee joint to the talocrural.

From the wound puff contaminated brownish-blue color of muscles, impregnated with the blood. In the wound is visible the broken end of the tibia, displaced towards the inside, toward the rear and upwards.

Periosteum is partially scaled with the small hemorrhages. The

length of wound is 34 cm, cross size/dimension from 4 to 8 cm.

The second linear wound is long in 18 cm with the smooth edges is located on the internal surface of shin, its cross size/dimension to 3.5 cm. In the region of wound cellulose is edematic, with the hemorrhages, the muscle of dark red color.

Skin of shin, especially in the region of the first wound, is strained, Bordeaux red-cyanotic, with the scaled by places epidermis. In subcutaneous cellular tissue of the region of talocrural joint is visible hematoma. In middle third of the front face of shin at the lateral edge of wound on the skin are visible fine/small wounds with the uneven edges, the diameter to 0.7 cm. Foot in the talocrural joint is dislocated towards the inside.

In the X-ray photograph (Fig. 175) are visible multiple metallic fragments. On the boundary of upper and middle third is noted the break of the tibia, which approaches oblique. In upper third of the same bone is visible cross with break without the displacement.

Fig. 175 is of interest from different point of view, in particular, as the example of the multiple blind-end wound of soft tissues.

Perforating wounds. Cross and longitudinal breaks of both bones of shin and each of them individually were encountered rarely.

Table 203. Frequency of the cross, longitudinal and packed in breaks of the individual bones of shin in connection with the level of wound (in the percentages).

(1) Наименование кости	(2) Вид перелома	(3) уровень ранения по гребям			
		(4) верхняя	(5) средняя	(6) нижняя	(7) сочетания уровней
(8) Большеберцовая	Поперечный (9)	1,4	1,9	1,0	1,4
	Продольный (10)	1,8	1,1	1,1	1,4
	Вколоченный (10)	0,7	0,1	0,3	—
(11) Малоберцовая	Поперечный (9)	3,8	3,5	3,9	—
	Продольный (10)	0,9	0,2	0,9	—
	Вколоченный (10)	—	—	—	—

Key: (1). Designation of bone. (2). Form/species of break. (3). Level of wound on third. (4). upper. (5). average/mean. (6). lower. (7). combination of levels. (8). Tibial. (9). Cross. (10). Packed in. (11). Fibular.

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Thus, for instance, cross and longitudinal breaks of both bones among other forms/species composed 3.90/o, the breaks of the tibia - 2.60/o, and fibular - 4.30/o.

Tangential wounds. With the tangential wounds the described forms/species of breaks were encountered somewhat more frequently than with other means of wounds; sc, the cross and longitudinal breaks of fibular bone among other forms/species of breaks compose 7.00/o, and tibial - 1.50/o. With the tangential wounds was observed only cross break of both bones (10.00/o).

Wound canals. Wound canals with the cross and longitudinal breaks were not characterized by large the complexity of structure which in this case depended mainly on the form/species of the wounding shell.

With the longitudinal breaks the zone of wound canal with respect to the length of break was increased in the proximal and

extremital direction. The latter fact had vital importance for determining the possible complications from the side of joints.

That presented above concerned general/common/total characteristics of the individual forms/species of the breaks of the bones of shin. For the completeness of the picture of the surgical anatomy of the wounds of shin it is necessary to examine some special features/peculiarities of the bullet breaks of bones, and also wounds of other tissues of shin (vessels and nerves).

Some special features/peculiarities of the bullet breaks of the bones of shin.

The surgical anatomy of the bullet breaks of the bones of shin, observed immediately or soon after wound, to a considerable degree differs from those changes which are encountered subsequently period with the development of complications and the development/detection of the actual zone of the damage of bones.

The described above individual forms/species of the bullet breaks in the overwhelming majority are escorted/tracked by the education of the fragments of the bones which, depending on their viability, have different value in the development of the subsequent complications. In addition to this, the different degree of jolt the

extremities in the moment/torque of break and connected with this development of complications differently determine the character/nature of the subsequent complications.

Finally, the formation of the cracks, which are propagated in the proximal and extremital direction, determines the possibility of implication in the process of those being adjacent of knee and talocrural joint, although the level of break can be located at significant distance from the joint line.

The viability of the broken ends of bones, as this was discussed above, is determined mainly by their relation to the periosteum and degree of their removal/distance from the place of break.

If one considers that the significant part of the tibia is covered only with skin, fascia and cellulose and, therefore, it is deprived of muscles, its fragments frequently can be deprived of nourishment, especially with the scaling of periosteum, which frequently is observed with the bullet breaks.

Consequently, with the crushed and even oblique breaks of the tibia the significant part of the fragments can be deprived of nourishment, in consequence of which they acquire the character/nature of foreign bodies.

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The broken ends of fibular bone in this sense are more viable, since this bone is surrounded from all sides by muscular tissue and, therefore, even with the scaling of periosteum in the smaller measure are subjected deaths.

But not only the individual broken ends of bone can as a result of the numbness (violation of nourishment) be foreign bodies. The region of the break, proximal and extremity broken end also subsequently can become numb. Numbness can be the result of the scaling of periosteum, thrombosis (veins and arteries) on the spot of break, and also violation of the integrity of Haversian canals and, therefore, damage of intraosseous/intraosteal/endoosteal vessels.

As the example it is possible to give the following observation.

Wound 30/III 1945. Death 6/V 1945. Preparation No 4604.

Comminuted bullet fracture of both bones of left shin in lower third.

On the preparation (Fig. 176) is visible break of both bones of shin in lower third, moreover the fragments of the tibia are scarce (2-3). Between the ends of the fibular bone of diastases of approximately 2.5 cm.

In lower third of the tibia on its internal surface is visible the crack which stretches from the place of break extremally, without reaching the talocrural joint on 1 cm (macroscopically).

On the posterior surface is visible the crack, which also goes to the region of talocrural joint, without reaching its line on 1 cm.

Is proximally visible the line of sequestration in the direction of crack, which stretches on the anteroexternal face of the tibia from the level of wound proximally on 6 cm, it passes on anterointernal than the surface of the tibia, being launched down, and it is united with the second crack which passes over the posterior surface.

The lower end of the crack stretches below place of wound to the front face of the tibia.

Entire described sector is located in the stage of sequestration.

As can be seen from Fig. 177, the sizes/dimensions necrosis of the broken ends of the tibia can be extremely great. Thus, if the size of the visible direct damage is within the limits of 3 cm, then 37 days after wound was defined the actual zone of damage, which captures almost wholly lower half of the tibia.

In this case is distinctly evident as the violation of the integrity of periosteum and internal vessels (crack), that escorts/tracks breaks, it leads to the fact that the separate units of the bone, it would seem, completely healthy/sound and being located far of the place of the application of force of the wounding shell, became numb as a result of the violation of nourishment. On the cracks the infection penetrated in the area of talocrural joint, and the wound of the bones of shin was complicated by the suppurative inflammation of talocrural joint.

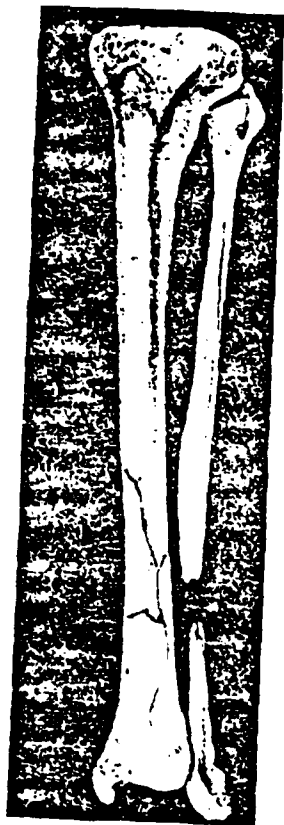


Fig. 176. Comminuted fracture of both bones of left shin in lower third (preparation No 4604).

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If in the process of the surgical processing of the wound of shin with the break of bones it managed to a certain extent easy to define the viability of individual fragments, then to establish/install the zone of the viability of the proximal and

extramital broken end both tibial and fibular bone always was not possible. Roentgenography could not help surgeon during the first days after break to define the real zone of the damage of bones. If the scaling of periosteum and the violation of the integrity of the very substance of bone have substantially a value for the definition of the zone of necrosis, then not smaller role plays the violation of nourishment, caused by the jolt of bone marrow.

At the moment of wound, especially tibia, is observed the jolt of bone marrow, moreover the degree of the violation of its integrity and extent are directly proportional to the striking power of the wounding shell and degree of the decomposition of bone. Especially important value have multiple hemorrhages into bone marrow and spongy substance of the pineal systems where there can be the macroscopically invisible breaks of individual trabeculas. Hemorrhages can be both focus and solid. Those, etc. determine complexity and severity of the complications, which develop during the subsequent course of wound. The education of hemorrhages is unavoidably escorted/tracked by the development of the thromboses of the fine/small vessels, especially intraosseous and, therefore, by the violation of the nourishment of bone.



Fig. 177. Zone of the necrosis of the tibia with its bullet break, that was determined at the beginning of the second month (preparation No 4604). a) form/species with anterointernal than the surface; b) form/species from front-external surface; c) back elevation.

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The described phenomena considerably more brightly are expressed with the breaks of the tibia, than with the breaks of fibular. The latter

is explained by the special features/peculiarities of structure and by the greater massiveness of the tibia.

Singular value has crack formation. As a rule, cracks are observed most frequently with the multifragment and crushed breaks, especially the diaphysis of bones. Cracks can be the single and multiple, going from the place wounds both in the proximal and in the extremital direction. As the example it is possible to give the following observation.

Wound I/IX 1942. Amputation 9/IX 1942. Preparation No 998. Perforating bullet wound of middle third of right shin with the large-splintered break of the tibia and the violation of the integrity of vessels. Amputation apropos of gangrene as a result of the wound of vessels.

On the preparation it is evident that the region of the direct decomposition of the tibia is not especially great - in the limits of 5 cm. In the proximal direction to the region of knee joint go several cracks, which pass both on the front-medial and on the anterolateral face tibia (Fig. 178a). Thus, on front-medial side crack goes upwards almost to the level of tuberosity of the tibia and changes to its posterior surface. On the anteroexternal face of the tibia are two cracks, which are also guided upwards, of which one,

arranged/located toward the rear, is clamped with that described above, that passes over the posterior surface, in consequence of which the cut of bone by length is almost in 15 cm surrounded by that described by cracks (Fig. 178b). In addition to this, on the posterior surface are visible two cracks, which go in the extremal direction almost to the lower pineal system.

The cracks, which surround the individual fragments of bone, as shown in Fig. 178, during the hemorrhages into bone marrow and with the scaling of periosteum they actually deprive are nourishment these sectors of bone and, therefore, they can subsequently cause their numbness. The cracks of the tibia, especially in the region of pineal systems, hardly ever can be discovered on roentgenogram. Cracks play very large role in the development of complications from the side of joints. Therefore in the various forms of breaks it is possible to expect that the frequency of the implication of joints in the process will be different (table 204), since not all forms/species of breaks were equally frequently escorted/tracked by cracks.

From given data it is evident that the implication in the process of the adjacent joints with all breaks (except longitudinal) of the tibia is observed more frequently than with the breaks of fibular. Of the individual forms/species of the breaks of the tibia arthrites more frequently were observed with the crushed breaks and less frequent with the oblique ones.

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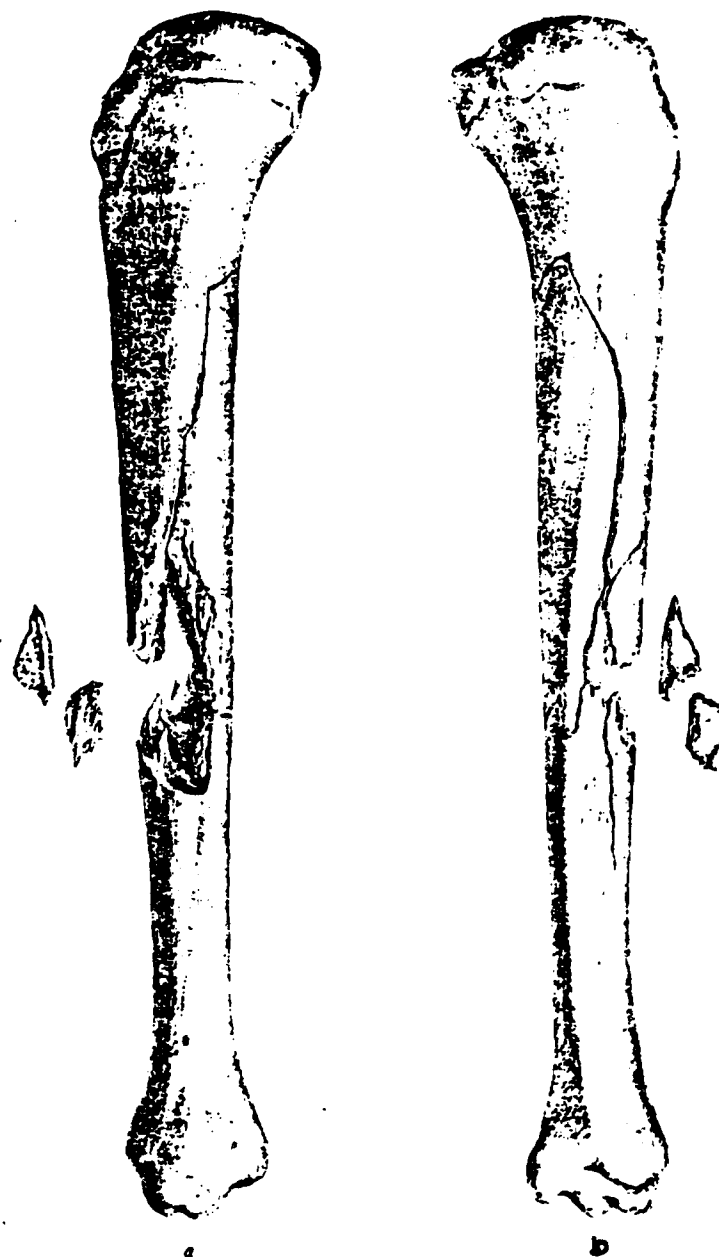


Fig. 178.

Table 204. Frequency of suppurative arthritides with the bullet breaks of the bones of shin (substances percentages).

(1) Наименование кости	(2) Вид перелома							(10) В сред- нем
	(3) про- дол- ный	(4) раздроб- ленный	(5) мелко- оскольча- тый	(6) кра- евой	(7) попереч- ный	(8) крупно- оскольча- тый	(9) косой	
(11) Большеберцовая	2,9	4,3	2,3	1,6	2,6	1,6	0,8	1,4
(12) Малоберцовая	12,5	0,8	0,4	0,6	—	0,6	—	0,7
(13) Обе кости	—	3,1	3,7	—	4,7	3,6	2,0	3,1

Key: (1). Designation of bone. (2). Form/species of break. (3).

longitudinal. (4). crushed. (5). small-splintered. (6).

Marginal *Transverse* *Oblique*
~~edge/boundary~~. (7). ~~cross~~. (8). Large-splintered. (9). ~~by side~~ ~~but~~.

(10). On the average. (11). Tibial. (12). fibular. (13). Both bones.

Fig. 178. Large-splintered break of tibia bone in middle third with the education of multiple cracks (preparation No 998). a) form/species from front-external surface; b) back elevation.

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Even more frequently were observed arthrites with breaks of both bones of shin, which is evident from the graph "on the average" of table 204. But if we examine the frequency of arthrites depending on the level of break, then it appears that the breaks in upper third were accompanied by arthritis of knee joint into 4.80/o, the breaks in middle third were escorted/tracked by arthritis (knee and talocrural joint) into 0.70/o, and in lower third (arthrites of talocrural joint) - into 1.10/o. Thus, most frequently arthrites were encountered with the break of the bones of shin in upper third.

Above in the description of the individual forms/species of the breaks of the bones of shin attention was paid to the damage of soft tissues. Severity the courses and the complication of the breaks of the bones of shin to a considerable degree depend on the violation of the integrity of the basic vessels of shin.

In connection with the fact that the degree of the decomposition

of soft tissues and bones in the various forms of breaks is different, the frequency of the wounds of vessels is also different (table 205).

As can be seen from these data, most frequently the violation of the integrity of vessels was observed with the crushed breaks, i.e., when was most of all disrupted the integrity of the soft tissues of shin. The nearness of the individual arteries of shin to its bones determined the high degree of the probability of their damage. Hematomas with the bullet breaks of the bones of shin were the result of damaging not only of basic arteries, but also fine/small arteries, and equally veins.

The topography of hematomas was different and was determined to a certain extent by fascial spaces, intermuscular and interfascial layers. In topographic sense it is possible to distinguish the following forms/species of hematomas:

intraosseous/intraosteal/endosteal, subperiosteal, near-bone, intermuscular. The first three forms/species of hematomas were connected directly with the place of break. However, intermuscular hematomas were different, depending on what group of muscles was damaged and, therefore, within the limits of what fascial bed was noted the accumulation of the blood. Distinguished hematomas of front/leading bone-fascial bed shins, hematoma of the external

bone-fascial bed of shin, hematoma of the posterior bone-fascial bed of shin.

Intraosseous/intraosteal/endoosteal and subperiosteal hematomas, as a rule, were encountered in all forms of the breaks of the bones of shin. Depending on the form/species of break the extent of hematomas varied to a considerable degree, to what in any case contributed the described above cracks.

Near-bone hematomas were encountered, as a rule, in all forms of the breaks of the bones of shin. However, their extent with each form/species was different, which depended on the diameter of the damaged vessel: the larger the vessel, the greater the hematoma. Generally they were more expressed with the breaks of the tibia.

Table 205. Frequency of the wounds of vessels with different breaks of the bones of shin (on 100 casualties according to each form/species of break) (author's development).

(1) Раздроб- ленный	(2) Попе- речный	(3) Мелко- осколь- чатый	(4) Крупно- осколь- чатый	(5) Воло- книстый	(6) Продоль- ный	(7) Краевой	(8) Косой	(9) Дырча- тый
46,7	6,4	4,9	6,8	9,1	4,3	4,9	5,2	3,4

Key: (1). Crushed. (2). ~~cross~~. (3). Small-splintered. (4).

Large-splintered. (5). ~~Packed in~~. (6). Longitudinal. (7).

~~Marginal~~. (8). ~~By sand bar~~. (9). Perforated.

Oblique

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Intermuscular hematomas. The damage of the basic vessels of the shin of both arteries and veins was escorted/tracked by the formation of extensive hematomas. In such cases the issuing from blood fulfilled either individual bone-fascial spaces or also contiguous, depending on the violations of integrity by the wounding shell of individual fascias.

Hematomas of the front/leading muscular bed of shin. This form/species of hematomas more frequently was encountered during the violation of integrity a tibialis anterior. The issuing from blood fulfilled to the gunstock of extensors (Fig. 179).

Bone-fascial bed, restricted from the anteroexternal surface of shin by its own fascia, from the sides by the bones of shin, and from behind - interosseal membrane/diaphragm, was the space whose volume as a result of a small pliability/compliance of tissues little was changed. The issuing from blood, and also developed following the wound edema squeezed soft tissues, in consequence of which was disturbed normal blood circulation and were created the conditions, which contributed to the numbness of muscles, and the latter favored the development of anaerobic infection.

Hematomas of external muscular bed. Isolated/insulated hematomas of this space were observed only with the breaks of one fibular bone, moreover with damage a peronea. As a rule, these hematomas were small and the issuing from blood was propagated mainly in the proximal and extremital direction. In this bone-fascial bed the blood penetrated also with bullet breaks of both bones of shin and during the damages of other vessels. The topography of hematomas of external muscular bed is represented in Fig. 180.

Hematomas of the posterior muscular bed of shin. Bulk of the muscular tissue of shin is included in the posterior bed. Here occurs tibialis posterior, from which is risen from a peronea.

Hematomas of this department of shins, connected with damage a tibialis posterior, were usually extensive and they were arranged/located in different layers (Fig. 181).

Posterior muscular bed section deep plate of its own fascia of shin to two departments: front/leading, that contains deep flexors and posterior, in which are included m soleus, m gastrocnemius and tendon m plantaris.

As the example of hematoma of the front/leading department of the posterior muscular bed of shin it is possible to give the following observation.

Wound 6/VIII 1943. Death 7/VII 1943. Preparation No 386/3110. Perforating fragmentation wound of middle third of shin with the damage to the tibia. Anaerobic infection.

On the front face of right shin is a wound by the size/dimension 8x4 cm, with the uneven, partially crushed edges. In the depth are visible the uncovered tendons of extensors, impregnated with the blood. On the posterior surface of shin is a second wound by the size/dimension 10.5x5.5 cm, also with the uneven edges. Skin in

the periphery is strained. Extremity is edematic, increased in the volume.

In the X-ray photograph is determined the multifragment break of middle third of tibia bone, and also the crack, on reaching ca 2 cm the line of joint. On the sagittal cut (Fig. 182), carried out along the tibia bone through the place of break, in the spongy substance of the proximal department of the tibia evidently abundant hemorrhage. Is noted hemorrhage, also, on the spot of break.

Large hematoma size/dimension 8.5x5.5 is disposed of in the front/leading department of posterior muscular bed. In addition to this, is insignificant hematoma between a soleus and a gastrocnemius.

Fig. 182 shows not only hematoma of the front/leading department of the posterior muscular bed of shin, but also intraosseous/intraosteal/endoosteal, subperiosteal and paraossal hematomas.

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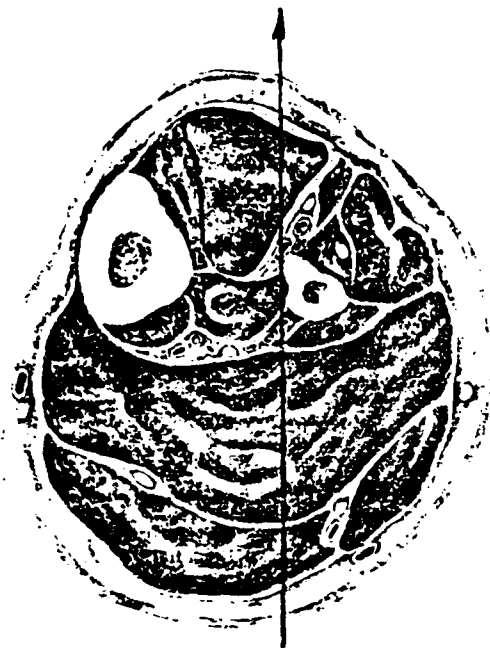


Fig. 179.

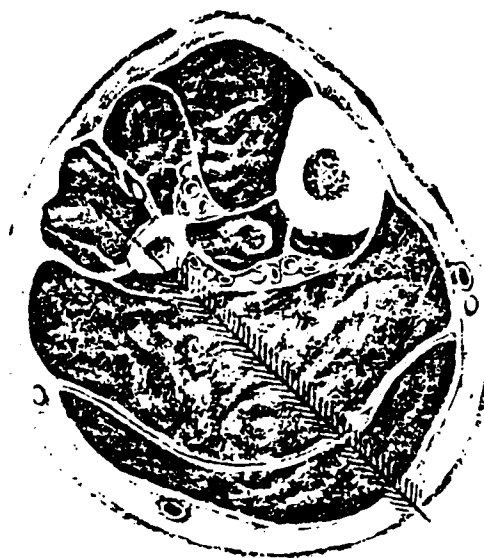


Fig. 180.

Fig. 179. Topography of hematoma of front/leading bone-fascial bed of shin. Scheme.

Fig. 180. Topography of hematoma of external bone-fascial bed of shin. Scheme.

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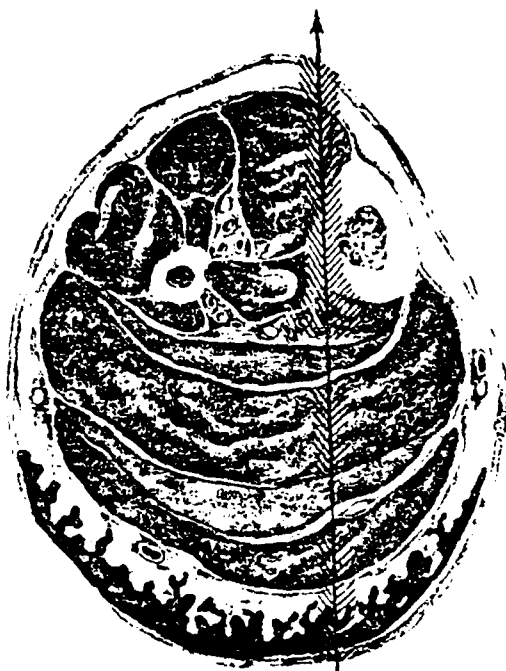


Fig. 181. Topography of hematomas of posterior bone-fascial space of shin. Scheme.

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As a result of the fact that the wounding shell frequently disturbed the integrity of several ones, and sometimes also all fascial spaces of shin, the topography of hematomas could be very complex. As example can serve the following observation.

Wound 2/III 1942. Died 4/III 1942. Preparation No 736/1781.
Perforating fragmentation wound of both shins with the large defect of soft tissues, their roughness and with the break of bones.

In the X-ray photograph is visible the break of lower third of the tibia with the presence of metallic fragments.

On the posterior surface of lower third of left shin is an extensive wound with the uneven edges and the uneven bottom, on which are visible the scraps of tendinous tissue.

On frontal cut, carried out through the region of wound (Fig. 183), is visible the break of the tibia with the insignificant displacement of broken ends to the medial side. In the region of the break the hemorrhage, which penetrates into the spongy substance of bone, for the insignificant elongation/extent in the proximal and extremal direction. Hematoma from the region of wound stretches to the medial and lateral side, penetrating the soft tissues of the posterior department of shin. Is noted also hemorrhage, also, into the front/leading fascial space of shin.

In a number of cases the issuing from blood was accumulated in significant quantities in any individual space, as is evident from the following observation.

Wound 25/II 1942. Death 8/III 1942. Preparation No 247/735.

Bullet multifragment break of the bones of left shin.

On X-ray photograph are visible comminuted fracture of both bones of shin, unit of the bone broken ends with illegible outlines. Is noted a large quantity of the smallest bone broken ends in the soft tissues of the region of wound. Is noted the strain of soft tissues; in the X-ray photograph is evident their lamination.

On the cut, carried cut in the sagittal plane through the region of wound (Fig. 184), it is possible to see the decomposition of bone and soft tissues, moreover the region of wound is impregnated with the blood which is propagated in the proximal and extremital direction in the posterior department of posterior muscular bed.

The given illustrations show, as is complex the topography of hematomas, especially in the posterior department of shin.

As a rule, hematomas it is difficult to remove during the surgical processing of wound. The blood remains in the tissues and is nutrient medium for the penetrating into the wound microorganisms.

Hematomas in the tissues of shin disturb blood circulation and they contribute to the development of severe complications both soon after the wound and subsequently period.

Damage of the nerves of shin.

The topographic nearness of the basic nerves of shin to its bones is one of the reasons relative to their frequent damage with the bullet breaks of bones (22.20/c). Thus, a tibialis nearly precisely adjoins to the posterior surface of the tibia. Equally a peroneus communis it lies/rests directly on the fibular bone at upper third of it. A somewhat different position/situation occupy a peroneus superficialis and profundus. The latter in middle third are surrounded by soft tissues, whereas in lower third they also almost directly adjoin to the bones.

Different degree of the damage of the soft tissues of shin in the various forms of the breaks of its bones affected also the frequency of the damage of nerves (table 206).

From given in table 206 data it follows that the more disrupted the integrity of bones, the more frequently was observed the damage of nerves; in this case in the first place will come the crushed breaks, on the latter - perforated.

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Described above peculiarity of the topography of nerves shows up during the distribution of the cases with the damage of nerves depending on the level of wound. Thus, if we take all breaks of the bones of shin with the damage of nerves as 100, then in the fraction/portion middle third it is 39.7o/o, lower - 38.5o/o and upper - 18.9o/o, combinations third - 2.9o/o.

Thus, bulk of the breaks of the bones of shin with the damage of nerves falls to middle and lower third.

Suppurative flows their topography.

As can be seen from that depicted above, the degree of the damage of the integrity of soft tissues in the various forms of the bullet breaks of the bones of shin is also characterized by known variety.

Substantially value has a violation of the integrity of the individual fascial and intermuscular spaces which mainly define both the topography and routes/paths of the dissemination of flows.

Known values in the education of flows have also the cracks of the individual bones of shins, which facilitate the dissemination of suppurative process in the proximal and distal direction.

The analysis of data, obtained as a result of the deepened development of the histories of disease/illness, shows that the frequency of suppurative flows with the breaks of the tibia was found in the dependence on the complexity of break and, therefore, from the degree of the damage of soft tissues, as is evident from table 207.

Table 206. Frequency of the damage of nerves in the various forms of the bullet breaks of the bones of shin (in the percentages).

(1) Раздроб- ленный	(2) Попе- речный	(3) Мелко- осколь- чатый	(4) Крупно- осколь- чатый	(5) Воло- чатый	(6) Продоль- ный	(7) Краевой	(8) Косой	(9) Дырча- тый
39.5	27.2	20.8	20.4	18.2	14.9	14.5	14.4	11.9

Key: (1). Crushed. (2). *Transverse*. (3). Small-splintered. (4). Large-splintered. (5). *Impacted*. (6). Longitudinal. (7). *Marginal*. (8). *Oblique*. (9). Perforating.

Table 207. Frequency of suppurative flows and phlegmons in the various forms of the breaks of the bones of shin (in the percentages).

(1) Вид перелома	(2) Наименование кости		
	(3) Большебер- цовая	(4) Малобер- цовая	(5) обе кости
(6) Косой	16.3	9.3	17.6
(7) Раздробленный	15.2	8.7	4.6
(8) Волочатый	12.5	0.0	0.0
(9) Крупнооскольчатый	12.4	13.1	15.6
(10) Продольный	11.8	0.0	0.0
(11) Поперечный	10.5	14.0	11.6
(12) Мелкооскольчатый	9.8	11.4	17.8
(13) Краевой	9.2	9.9	17.2
(14) Дырчатый	7.1	15.8	26.3
(15) В среднем	10.7	10.7	9.5

Key: (1). Form/species of break. (2). Designation of bone. (3). tibial. (4). fibular. (5). both bones. (6). *Oblique*. (7). Crushed. (8). *Impacted*. (9). Large-splintered. (10). Longitudinal. (11). *Transverse*. (12). Small-splintered. (13). *Marginal*. (14). Perforated. (15). On the average.

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Fig. 182. Hematoma of the front/leading department of the posterior muscular bed of shin. Preparator VMM No 386/3110. (Artist T. V. Belyayeva).

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Fig. 183. Topography of hematoma with the break of the tibia.
Preparation VMS No 736/1781. (Artist T. V. Belyayeva).

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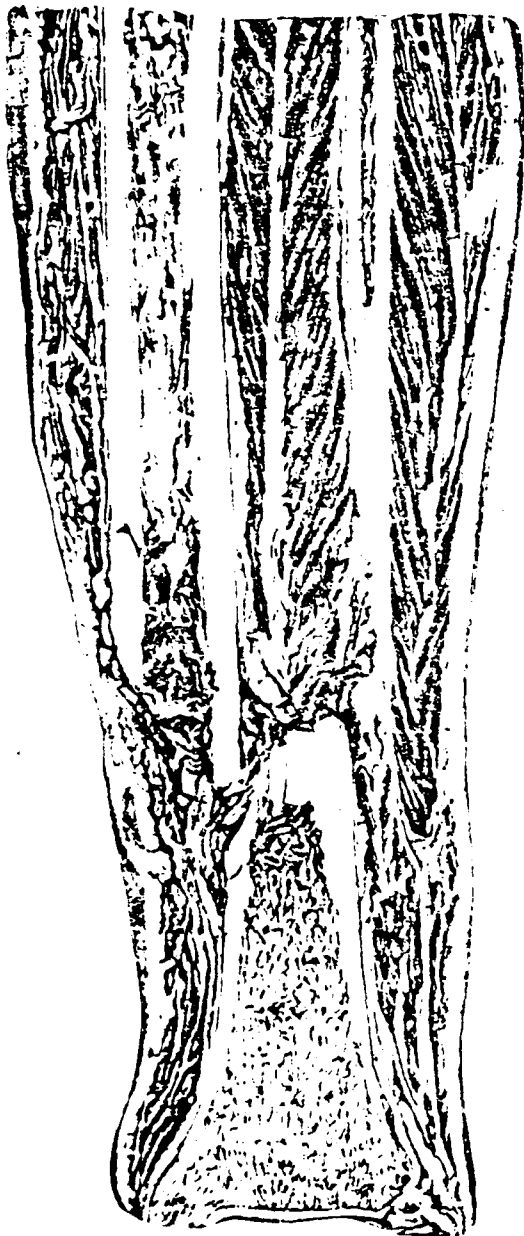


Fig. 184.

Fig. 184. Topography of hematoma with simultaneous break of both bones of shin. Preparation VMM No 247/75. (Artist T. V. Belyayeva).

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During the damage to the tibia more frequent suppurative flows were observed with oblique breaks (16.30/o).

With the breaks of fibular bone the flows were observed most frequently with the perforated and cross breaks, since, in view of the small decomposition of soft tissues, these breaks more rarely underwent primary surgical processing. On the same reason most frequently the flows were observed with perforated breaks of both bones of shin (26.30/o).

In given data attention is drawn to the very low percentage of flows with crushed breaks of both bones of shin. The latter is explained by the special severity of this form/species of breaks, as a result of which such casualty seen after wound long before the capable of being development of phlegmons and flows was produced the amputation.

Is interesting the fact that the flows were not observed with

the packed in and longitudinal breaks of fibular and both bones of the shin where the degree of the damage of soft tissues was insignificant.

The topography of flcws is determined by building/structure of bone-fascial spaces of shin (Fig. 185).

From their own fascia of shin to the fibular bone will withdraw the dense fascial plates septum intermuscleare anterior et posterior, which participate in the education of three bases bone-fascial of spaces - front/leading, external and posterior.

In the front/leading bone-fascial bed are included by m tibialis anterior, m extensor digitorum communis longus, m extensor hallucis longus, a tibialis anterior, veins and n peroneus profundus.

In the external bone-fascial bed it is found by m peroneus longus et brevis, in the upper part of it - n peroneus superficialis, in the lower - a peronea.

In the posterior bone-fascial bed, divided by deep strip of natural fascia into the front/leading and posterior department, they are found: in the front/leading department m tibialis posterior, m flexor hallucis longus, m flexor digitorum communis longus, a

tibialis posterior, vein and n tibialis, while in the posterior department m soleus, m gastrocnemius and tendon m plantaris.

Suppurative flows and phlegmons can be observed in the individual fascial spaces, in the contiguous ones, and also in the intermuscular slits and on the course of vessels.

In topographic sense it is possible to distinguish the following basic means of flows: front/leading, external and posterior.

Front/leading flows are most frequently the result of damage to the tibia (its upper pineal system), especially with the blind-end wounds. In these cases pus fulfills intermuscular slits and on the course of vessels it is propagated in the proximal and extremal direction (Fig. 186).

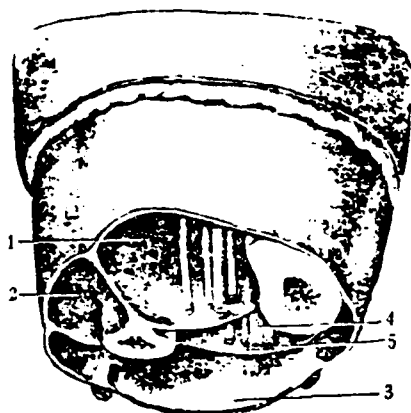


Fig. 185. Bone-fascial spaces of shin. 1 - front/leading bone-fascial space; 2 - external; 3 - posterior department of posterior bone-fascial space; 4 - front/leading department; 5 - deep plate of their own fascia of shin.

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External flows. With the external flows pus is accumulated in the limits of external bed. The isolated/insulated external flows are encountered rarely and mainly with the isolated/insulated breaks of fibular bone. Pus in these cases is arranged/located superficially (Fig. 187). Its dissemination in the proximal and extremital direction is limited by the limits of bone.

Posterior flows. The latter/last group of flows has great practical value, since they are observed with the isolated/insulated

breaks of individual bones and both together. The complexity of topographic relations in the posterior department of shin determines the special features/peculiarities of localization here of suppurative accumulations.

Among the posterior flows it is possible to distinguish their following three forms/species.

1. Flows of front/leading department of posterior space of shin, with which pus is located in bed of deep flexors, toward the front from deep plate of its own fascia of shin. Pus in these cases on the course of vessels (canalis crurcpcpliteus) can be propagated both into the popliteal pit and to the bottom surface of foot.

The accumulation of pus is arranged/located deeply, which impedes diagnosis and treatment (Fig. 188).

2. In contrast to first form/species pus with second means of flows is propagated under a scleus toward the rear from deep plate of its own fascia of shin. In these cases pus easily is propagated both in the proximal and in the extremital direction. As a result of the fact that with the bullet breaks of the bones of shin is disturbed the integrity of a deep fascial plate, the frequently described means of flow is combined with the first.

3. With third means of flow pus is accumulated between m soleus and m. gastrocnemius - intermuscular flow (Fig. 189).

The accumulation of pus between the named muscles easily is propagated into the popliteal pit. In the extremital direction the pus can reach the region of heel. Besides the described means of flows, is sometimes observed the accumulation of pus toward the rear from m gastrocnemius.

The described means of flows with the bullet breaks of the bones of shin frequently are combined one with another, and in the process of the development of suppurative complications one means of flow can change in another and in this respect plays large role paravasal and paraneural cellulose, and also histolytic properties of pus.

Symptoms diagnosis of the bullet breaks of the bones of shin.

Clinical symptomatology diagnosis of the bullet breaks of the bones of shin.

Doctor of medical sciences the Lieutenant Colonel of medical service
A. A. Nikitin.

The correct and timely diagnosis of the bullet breaks, including the breaks of bones shins, estimate of the general condition of casualty and resistivity of his organism not only determined the medical evacuation measures with respect to of this type by casualty, but also to a considerable degree they influenced course and outcome of wound. Consequently, the earlier were established/installed the damage of bones and developing in wounded complication as local, so general character/nature, the more rational there were the therapeutic measures in the stages of evacuation.

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In accordance with the anatomical-physiological special features/peculiarities of shin the symptoms of the bullet breaks of bones to a considerable degree vary and depend, on one hand, from the degree of the decomposition of the tissues of shin, and on the other hand, on the observed frequently complications with this wound and on changes in the general condition of the organism (in detail see in the general/common/total unit of this volume). On concerning complications, which exceeds the limits of present chapter, the diagnosis of the breaks of the bones of shin must be examined separately in the following order/formation: a) with damages of both

bones of shin, b) during the isolated/insulated damages to the tibia, c) during the isolated/insulated damages to fibular bone.

Almost half of the wounds of shin with damage of both bones, according to I. A. Zvorykin's data, related to the mine wounds with the large zone of the crushing of the bones of shin and foot, with frequently observed in this case disengagement of foot. According to the data of the deepened development, the frequency of shock with the breaks of the bones of shin composed 5.30/o.

The violation of the function of extremity - earliest symptom with break of both bones of shin, since with this break casualty could not independently be moved. The strain of shin on the spot of break was expressed usually in the form of the displacement of fragments at the angle, opened towards the outside by deflection force of foot under the activity of its inherent severity. Shortening of extremity was usually not more than 2-3 cm, rarely exceeding these numerals.

Generating with the bullet, and also small-splintered wounds with break of both bones of shin hematoma, meeting obstacle to its dissemination from the side of the low-mobility fascial case of shin, conditioned increase by several centimeters of the periphery of the victim of shin in comparison with the healthy/sound.

The isolated/insulated damage to the tibia, as show data of the deepened development of histories diseases/illnesses, was encountered one and a half times more frequently than damage of both bones.

Clinical picture with the break of one bone was less heavy than with break of both bones of shin. The surviving fibular bone served as as "spacer", creating in a sense the immobilization of the broken tibia and decreasing thereby painful syndrome. Shock condition with the break of one bone was observed more rarely than with break of both bones of shin. Strain in the form of varus bending of shin did not usually achieve high degrees, but the shortening of extremity rarely exceeded 2 cm. Since load completely falls on the tibia, its damage disturbed the function of extremity to the same degree as damage of both bones. Front-medial unit of this bone is not covered with muscles, it is easily open-door and palpation, which facilitates the diagnosis of its breaks.

The isolated/insulated damage to fibular bone was encountered almost 2 times less frequent than the break of the tibia. Surrounded by the powerful/thick case of muscles, fibular bone does not bear the load function of extremity. Casualty with the damage to this bone for a while still can independently be moved. This fact created the

greatest diagnostic difficulties in the foremost stages as this will be evidently from the future, and it served as the occasion of the reference of casualties with the break of fibular bone "easily wounded", moreover frequently diagnosed itself of the wound of the "soft tissues of shin".

The described clinical picture of the breaks of the bones of shin is observed with the uncomplicated breaks and is typical for the full/total/complete breaks.

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With the edge/boundary and perforating breaks of the bones of shins whose clinical diagnosis presented significant difficulties in view of the absence of the basic symptoms of break, clinical picture considerably differed from that given above.

It is necessary to keep in mind that with the breaks of the epi-metaphysial units of the tibia with the presence of going towards knee or talocrural joint cracks the joint frequently in no way was infected. But if the course of such breaks was complicated by suppurative process in the joint, then the condition of casualty sharply deteriorated and the clinical diagnosis of these breaks and the corresponding therapeutic measures acquired special importance.

On the basis of the author's development of the histories of the disease/illness of casualties with the bullet break of the bones of shin are acquired following data about the stages, in which was established/installed the bullet break of the bones of shin (table 208).

In 9.20/o of all breaks of the bones of shin the stage, in which was established/installed the diagnosis, explained could not be.

In the army area the diagnosis of break of both bones of shin was established/installed into 92.80/o, that of the break of one tibia - in 86.60/o and one fibular - into 58.50/o.

It is completely obvious that the greatest diagnostic difficulties appeared with the isolated/insulated break of fibular bone, moreover into 30.20/o diagnosis it was established/installed in the army area and into 11.30/o - in the front line predominantly by x-ray examination.

The isolated breaks are more than the tibial bone whose diagnosis was established/installed with the aid of the primary X-ray photograph in the army area into 9.30/o and in the front line - into

4.10/o, they relate to the perforated and edge/boundary damages of the metaphysial sections of this bone.

In certain cases the casualties, passing army therapeutic installations, entered directly into the army hospitals where was established/installed final diagnosis.

Generally the break of the bones of shin in the majority of cases was diagnosed soon after wound. The diagnosis of break of both bones of shin was established/installed in the army area for the first 6 hours after wound into 78.7c/o, from 6 to 24 hours - into 13.8c/o and in an insignificant number of cases (7.5c/o) - in the army area after the first day.

The breaks of one tibia were diagnosed in the army area in the first 6 hours after wound into 60.7c/o, from 6 to 24 hours - into 25.9c/o and after the first day - into 13.4c/o, of them in army region - in 9.3c/o and in the front line - in 4.1c/o.

Table 208. Stage of the establishment of the diagnosis of the bullet break of the bones of shin (in the percentages).

(1) Наименование кости	(2) Этап				
	ДМП	(3) ДМП и ХППГ первой линии	(4) Армейская ХППГ и эва- кугоспиталь	(5) Фронтальной эвакугоспи- таль	(6) Всего
(7) Большеберцовая	66,2	20,4	9,3	4,1	100,0
(8) Малоберцовая	22,1	36,4	30,2	11,3	100,0
(9) Обе кости голени	78,6	14,2	7,2	—	100,0

Key: (1). Designation of bone. (2). Stage. (3). DMP and KhPPG of first line. (4). Army KhPPG and evacuation hospital. (5). Front line evacuation hospital. (6). In all. (7). Tibial. (8). Fibular. (9). Both bones of shin.

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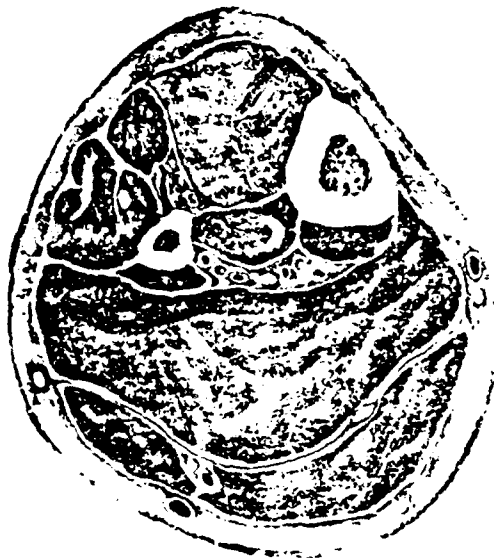


Fig. 186.

Fig. 186. Topography of front/leading flow.

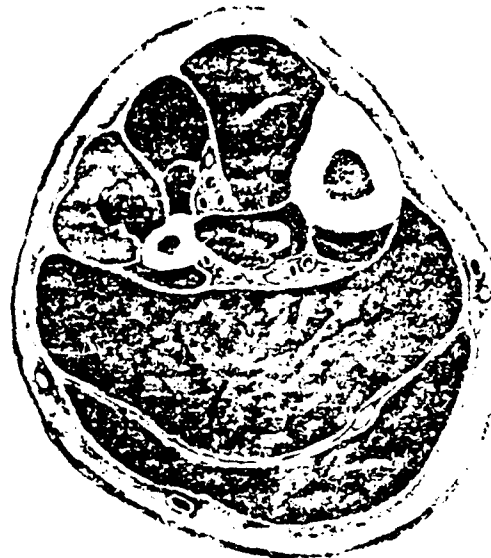


Fig. 187.

Fig. 187. Topography of external flow.

Page 480B.



Fig. 188.



Fig. 189.

Fig. 188. Topography of posterior deep flow.

Fig. 189. Topography of posterior intermuscular flow.

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The isolated/insulated break of fibular bone was established/installed in the army area in the first 6 hours after wound into 32.80/o of cases, from 6 to 24 hours - into 25.70/o and after the first day - into 41.50/o, of them in the army area - into 30.20/o and in the front line - into 11.30/o.

The periods of diagnosis to a considerable degree depended on the time of the entry of casualties to the stage of evacuation after wound, and in the army area and from the combat situation. However, the diagnosis of the isolated/insulated break of fibular bone in comparison with the breaks of other bones of shin retarded, although the casualties passed the army stages of evacuation approximately simultaneously. Consequently, the greatest diagnostic difficulties presented the isolated/insulated breaks of fibular bone. Almost in half of all cases the break of this bone remained undiagnosed in the army area, and casualties entered the following stage with the diagnosis of the wound of the soft tissues of shin. By the basic reason for the difficulty of the diagnosis of the isolated/insulated

break of fibular bone, as already was noted above, was the fact that the fibular bone does not bear load and casualties with its break could for a while be moved independently.

The diagnostic signs of the break of the bones of shin are multifeature. Clinical research is composed from the examination/inspection of casualty, measurement of the length of extremity, palpation and inspection/check of the function of the victim of extremity.

However, it is necessary to have in mind, as already mentioned that the possibility of the utilization of all diagnostic signs of break in the different stages of evacuation was not identical. From this point of view by most correct it is represented to examine the diagnosis of the bullet breaks of the bones of shin in the stages of evacuation, after secreting as the most critical in the sense diagnoses of army, army and front line areas.

Army area. The diagnosis of the bullet breaks of the bones of shin, as can be seen from given data, it did not meet serious difficulties, with exception of the isolated/insulated breaks of fibular bone. In the overwhelming majority of casualties damage of both bones of shin was identified with the rendering of first aid in the company by aidman or first aid at BMP by feldsher. At PNE, where

the conditions for the diagnosis were somewhat better, casualty inspected doctor. Straight/direct data in the card of forward area, that indicate the utilization of one or the other symptom for the diagnosis of break, it was not brought, since on the card is diverted place only for formulation of diagnosis and therapeutic measures.

However, the series/number of the measures which were conducted at PMP, with a certainty attests to the fact that the diagnosis was here based predominantly on the examination/inspection of wound and the determination of the violation of the function of the victim of extremity.

Immobilization extremities by splint and the character/nature of the assigned transport for the evacuation of casualty to the following stage were reflected in the card of forward area and they were the confirmation of the aforesaid.

According to the situation conditions in this stage the casualties did not undress, wounds did not undergo surgical processing, primary bandage was changed, only if to this there were readings/indications. However, under these conditions the attentive examination/inspection of casualty, his complaint of pain and violation of the function of the victim of the extremity helped to establish/install correct diagnosis. Thus, with breaks of both bones

of shin correct diagnosis was set in 78.60/o, and with the isolated/insulated breaks of the titia - into 66.20/o.

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Thus, basic work on the development/detection of the heaviest breaks of the bones of shin was realized in the foremost stages of the evacuation of army area.

As the example of the correct identification of the break of the bones of shin at PMP can serve the following observation.

T., 34 years, is wounded 6/III 1943 5 hours; in the hour it is delivered to PMP, where to it was made dressing, was introduced morphine and antitetanus serum.

Diagnosis with arrival: the perforating bullet wound of middle third of right shin with the damage to bone. At DMP the diagnosis of the break of bone was confirmed. Was discovered damage to fibula bone. Is produced dress/lavatory of wound and is superimposed the splint of Cramer.

9/III he entered KhPEG, where, besides the wound of right shin, came to light left-side pneumonia. On the recovery from pneumonia the

casualty was evacuated in the rear evacuation hospital where he underwent sequestrectomy.

In 5 months it is discharged with the dummy joint of fibular bone and limitation of movements in the talocrural joint.

At DMP and in KhPPG of the first line the conditions for the diagnosis were considerably better than at PMP. Besides those receptions/procedures of diagnosis which they put to use at PMP, the surgical processing of wounds, which was being conducted at DMP and in KhPPG of the first line, made it possible to establish/install another series/number of the essential signs of break to come to light/detect/expose which at PMP was impossible. Very important sign is the determination of the direction of wound canal. With the thorough examination/inspection and the estimate of it it is possible with the high fraction/portion of probability to suspect the damage of the bones of shin. The presence of the bone fragments in the wound, detected during its surgical processing, he indicates the violation of the integrity of bone and is reliable sign. Using favorable conditions for the diagnosis at DMP and in KhPPG of the first line, it was possible to bring the correct identification of bullet breaks of both bones of shin to 92.80/o, the isolated/insulated breaks of tibia - to 86.60/o, and by fibular - to 58.50/o.

In the army therapeutic installations almost completely was finished the diagnosis of the breaks: 11.30/o of isolated/insulated breaks of fibular bone, into 4.10/c of tibial they remained undiagnosed in the army area as a result of the impossibility to widely apply for the diagnosis roentgenography which was produced already in the following stage - in the front line area.

Thus, the diagnosis of the bullet breaks of the bones of shin in the army area was based exclusively on the clinical signs. However, in the army therapeutic installations in the unit of the cases was applied roentgenological research.

The character/nature of different symptoms, used for the setting of the diagnosis of the bullet break of the bones of shin, can be judged from Table 209.

From given in it data it is evident that, together with the examination/inspection of casualty and the palpation of the damaged extremity, was considered disturbance of function in all cases of damaging both both bones of shin and one tibial. The strain of extremity was observed almost into 3/4 breaks of both bones of shin and almost in half of the cases of damage to one tibia. With the

break of fibular bone this sign was not expressed. Such symptoms, so pathological mobility and crepitation on the spot of break whose development/detection was connected with the causing by the casualty of pain they did not logically have extensive application. Moreover, the value of these signs with isolated/insulated breaks of one of the bones of shin itself was insignificant.

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Sickliness with the load along the axis of extremity helped to diagnose the closed breaks. However, the presence of wounds with the bullet breaks decreased the authenticity of this sign as a result of the pains in the wound.

By very simple and convenient in the circumstances PMP and DMP symptom for the diagnosis of the bullet break of fibular bone is the symptom of the pains reflected. The essence of this symptom consists in the fact that after the approach of the bones of shin during their compression in the transverse direction in the distance from the place of the suspected break appears sharp pain on the spot of break. This symptom was not widely known and therefore it was used rarely.

In the presence of others is sufficient clear symptoms of the damage of the bones of shin the measurement of the length of

extremity, apparently it was not produced. The degree of the manifestation of clinical symptoms with the breaks of the bones of shin in the dependence on the form/species of the wounding shell (bullet or fragment), and also on the character/nature of wound (through or blind) did not reveal any constant and regular difference and was not reflected in the documentation.

One should only note that the violation of the function of the victim of extremity was insignificantly expressed during edge and perforated damages of the metaphysial sections of the tibia. This in essence impeded the timely diagnosis of these breaks. Heaviest clinical picture was noted with the fragmentation wounds with the large anatomical decomposition of the bones of shin. When the lack of vitality of the extremital unit of the extremity was established/installed, diagnosis was expressed briefly: the disengagement (or crushing) of shin surgical aid at DMP was finished with the truncation of extremity.

In the front line and rear therapeutic installations the clinic of the bullet breaks of bones reflected predominantly the dynamics of the healing of wounds and the degree of the consolidation of break. The symptomatology of the break in these installations in the rare cases was supplemented by the comparative measurement of the length of injured/damaged and healthy/sound extremity at the moment of the

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presentation/concept of casualty to the medical commission. The description of strains occurred, however, in a number of cases it is insufficient to full/total/complete ones.

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Table 209. Frequency of the development/detection of the individual signs of the bullet break of the bones of shin in the army and army therapeutic installations (in the percentages).

(2) Признак перелома	(1) Наименование кости	(3) Большеберцовая	(4) Малоберцовая	(5) Оте кости голени
(6) Нарушение функции конечности		100	58	100
(7) Деформация конечности		47	—	72
(8) Направление раневого канала		64	71	51
(9) Наличие костных осколков в ране		57	12	45
(10) Наличие капель жира в ране		3	—	5
(11) Патологическая подвижность		—	—	10
(12) Крепитация на месте перелома		—	—	2
(13) Болезненность нагрузки по оси конечности		9	7	—

Key: (1). Designation of bone. (2). Sign of break. (3). Tibial. (4). Fibular. (5). Both bones of shin. (6). Violation of function of extremity. (7). Strain of extremity. (8). Direction of wound canal. (9). Presence of bone fragments in wound. (10). Presence of drops of fat in wound. (11). Pathological mobility. (12). Crepitation on the spot of break. (13). Sickliness of load along the axis of extremity.

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Thus, for instance, with breaks of both bones of shin, indicated by the available X-ray photographs, occurred strain; furthermore, from the records it is evident that for its elimination were used the specific therapeutic measures, but the sharp description of strains greater partly was absent.

The timely preventive and therapeutic measures, directed toward the elimination of these complications, were decisive for the outcome of bullet breaks.

Finishing the study of the problems of symptomatology and diagnosis of the bullet breaks of the bones of shin, it follows on the basis of given data to recognize that the diagnosis of these breaks was sufficient correct and it did not cause significant difficulties in doctors, who worked in the army area. Thus, for instance, accurately established/installed at PMP, DMP and in KhPPG of the first line the diagnosis of break of both bones of shin into 92.80/o did not undergo changes itself in the subsequent stages.

The diagnosis of the isolated/insulated break of the tibia in the overwhelming majority was placed correctly in the army and army area and only into 4.10/o in the subsequent stages it was necessary it to refine. In the installations of army ones and even army the break of one fibular bone frequently was not diagnosed. The difficulties of the diagnosis of these breaks only by the some clinical methods of research, and also the sources of inaccuracy in the diagnosis of these breaks were given above. By the way to say, from a practical point of view the insufficiently early

identification of the break of fibular bone could not involve serious complications in further course of these breaks.

Roentgenological given during the bullet damages of bones shins.

Corresponding member of the Academy of medical Sciences of the USSR professor D. G. Rokhlin and the candidate of medical sciences V. P. Zaidvornova.

The first x-ray examination with the bullet breaks of the bones of shin was produced in the following stages: at DMP, in KhPFG and in the army evacuation hospital into 10.90/o, in the front line evacuation hospital into 40.90/o and in the rear evacuation hospital into 48.20/o.

In the front line and rear installations with the bullet breaks of the bones of shin extensively was used the roentgenological method of research. The need for this method of research for diagnosing the break was encountered however altogether only into 15.40/o, of them into 11.30/o for the development/detection of the isolated/insulated breaks of fibular bone and into 4.10/o for the development/detection of perforated and edge/boundary damages to the tibia. In all remaining cases roentgenography in these therapeutic installations served mainly for the diagnosis of the late complications of the

breaks of the bones of shin, among which in the frequency prevailed bullet osteomyelitis.

With the bullet breaks of the bones of shin in the overwhelming majority of the cases (into 89.1c/c) roentgenography and roentgenoscopy were used in the front line and rear therapeutic installations. In 28.80/o of cases to it did not resort mainly only in view of severity the damages of the bones of shin and connected with this complications, which led soon after wound to the amputation of extremity or to death of casualty.

The dependence of the course of wound on the special features/peculiarities of bullet break can be confirmed and refined during the study of clinical X-ray data both of the wounds, which flowed/occurred/lasted over the type of the closed break, and the breaks, complicated by osteomyelitis. During the comparison of these two types of the course of wound the forecasting importance of the special features/peculiarities of bullet break becomes completely convincing.

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The analysis of the special features/peculiarities of the favorably flowed/occurred/lasted bullet damages of the bones of shin

was produced on the basis of the study of the corresponding materials of the military medical museum. From a large quantity of histories of disease/illness were used only those, in which there were X-ray photographs, which illustrate the dynamics of bullet break. Were selected and subjected to analysis the histories of diseases/illnesses in which clinical X-ray data attested to the fact that the bullet damages of the bones of shin healed in the different stages of evacuation according to the type of the closed break.

Among similar on the whole of the favorably ending bullet breaks of the bones of shin perforating wounds were observed into 81.00/o, and blind-end wounds - only into 19.00/o. Contradictory/opposite relationships/ratios, namely the prevalence of blind-end wounds above the through ones, as it will be indicated below, were characteristic for the bullet wounds, which were complicated by osteomyelitis.

The bullet wounds during the bullet damages, which ended according to the type of the closed break, were observed into 67.10/o, whereas fragmentation - into 32.90/o.

With these favorably flowed/occurred/lasted breaks in the cases of blind-end wound alien metallic bodies in the overwhelming majority of the cases were observed in soft tissues (81.70/o), between the bone broken ends - into 13.30/o and in the bone - into 5.00/o.

With the bullet breaks of the bones of the shin of this form/species the tibia was damaged into 52.7o/o, fibular - into 43.2o/o and both tibial bones - into 4.1o/o.

Distribution according to the form/species of the break of the bullet damages to the tibia, which ended according to the type of the closed break, was the following: incomplete breaks - 29.3o/o (into 11.4o/o - perforated, into 17.9o/o - edge/boundary), full/total/complete breaks - 70.7o/o (into 29.3o/o - oblique and cross, into 16.2o/o - large-splintered, into 25.2o/o - small-splintered).

The frequency of the crushed breaks on this material was not refined. It is necessary to assume that this type of multifragment break in this group was encountered rarely.

Deserves attention the character/nature of the standing of broken ends with the full/total/complete bullet breaks, which ended according to the type of the closed break.

In 68.6o/o displacement of broken ends it was not roentgenologically discovered, into 21.2o/o was determined the

satisfactory standing of broken ends and only into 10.20/o was observed on the whole the mildly expressed displacement of broken ends.

Among the bullet breaks of fibular bone, which ended without complications, perforating wounds were 87.60/c, blind - only 12.40/o.

Bullet damages to the fibular bone, which ended according to the type of the closed break, were distributed according to the form/species of break thus: incomplete breaks - 24.10/o (among other things edge/boundary - 20.40/o, perforated - 3.70/o), full/total/complete breaks - 75.90/c (among other things oblique and cross - 25.50/o, large-splintered - 19.70/o and small-splintered - 30.70/o).

With the full/total/complete breaks the broken ends of fibular bone were not displaced into 71.30/o of cases, their standing it was satisfactory into 21.20/c, the moderate displacement was into 7.50/o of cases.

From those ending according to the type of the closed break of bullet wounds of both bones of shin without the displacement or with the satisfactory standing of broken ends were observed only oblique, cross and slantwise-cross breaks.

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Given data attest to the fact that the course according to the type of the closed break in the presence of the series/number of the special features/peculiarities in clinical X-ray picture, detected immediately after wound or after the short periods, was observed frequently.

Had the great possibility to end according to the type of the closed break wounds with the combination of one or the other special features/peculiarities of the bullet damages of the bones of shin, namely: the perforating, predominantly bullet wounds: nonperforating, predominantly with the absence of foreign body in the bone and between the broken ends; incomplete breaks; the breaks without the displacement of broken ends, predominantly noncomminuted; oblique, cross, slantwise-cross. Meanwhile the bullet damages of the bones of the shins, which are characterized by the combination of one or the other contradictory/opposite special features/peculiarities of wounds, more frequently flowed/occurred/lasted with complications.

First aid by casualty and transport immobilization with the bullet breaks of the bones of shin.

Docent Lieutenant Colonel of the medical service K. N. Kochevi B. A. Modestus.

The success of the measures, directed toward the reduction of the ability to work of casualties with the bullet break of the bones of shin, to the high degree depends on timely rendering of first aid and carrying out/removal of casualties from the field of combat.

Aid in the company sector rendered aidmen, medical instructors of medical separation/section troi/Torr or soldiers themselves by way of self-help and mutual assistance on the spot of wound. In certain cases according to the conditions of combat and area relief were created the possibilities for the rapid entry of casualties at BMP and PMP. In those cases the first aid proved to be doctor's assistant or doctor (Table 210).

Based on materials of the author's development of the histories of disease/illness, it is established/installed, that the frequency of auto- and mutual aid during the war increased by 30.00/o, and the frequency of rendering of first aid by feldsher - to 35.00/o, then was shortened the frequency of rendering of first aid by aidman and it is even more - by doctor.

An increase in the number of cases of auto- and mutual assistance toward the end of the war is explained by the acquisition of experiment/experience by the soldiers, that especially obtained 2-3 wounds, and by conducting in companies and battalions of the public health education work, which fixed/recorded attention in the rendering of first aid in combat. An increase in the number of cases of rendering of aid by doctor's assistant can be explained by the closest approach BMP to a front/leading edge during combat.

Table 210. Distribution of casualties with the bullet break of the bones of shin in the stages of rendering of first aid according to the data of the deepened development (in the percentages).

(1) Поле боя		БМП	ПМП	(4) Итого
(2) само- и взаим- помощь	(3) санитар	(4) фельдшер	(5) врач	
30,8	54,6	3,7	10,9	100,0

Key: (1). Field of checks. (2). auto- and mutual assistance. (3). aidman. (4). feldsher. (5). doctor. (6). Altogether.

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As the surgical dressing for the application of the first protective dressing they used the individual package, constantly carried by soldier, or the usual dressing packet, entering the set of the bursa of the first aid, available in medical instructor and aidman.

With the bullet breaks of bones the shins of the substance of primary temporary/time immobilization on the field of battle greater partly had the primitive character/nature (boards, sticks, the branches of trees, sedge, rifle, bandaging of the casualty extremity to the healthy/sound, etc.). Immobilization most frequently was realized in the sheltered from the fire place (infundibulum from the

burst of shell, natural terrain, etc.), which provided security in the relation to repeated wound and possibility of the application of dressing.

Based on materials of the deepened development, 85.9c/o of casualties with the bullet break of the bones of shin obtained first aid for the first 6 hours, and 14.1c/o - it is later than this period. Hence it follows that a maximum quantity of casualties with the break of the bones of shin obtained first aid at the first moments/torques after wound.

With each year of war the first aid by casualty proved to be increasingly earlier and it is earlier. Thus, during the first year of war for the first hour aid was shown/rendered 61.40/o of casualties, and in the fourth year - 78.50/o. According to the data about the rendering of first aid during the rout of the Germans in the environs of Moscow (1941) and in the environs of Berlin (1945), the difference in time is still more: 52.90/o in 1941 and 84.40/o in 1945.

The contraction/abbreviation of the periods of rendering of first aid after wound toward the end of the war must be explained mainly by the offensive character/nature of combat.

The carrying out/removal of casualties from the field of combat had vital importance after rendering of first aid. Casualties with the bullet break of fibular bone and with the perforated or edge/boundary damage to the tibia reached BMP or post of ambulance transport predominantly independently or with the aid of the comrades. However, remaining they carried or took out from the field of combat. It is completely obvious that the success of further treatment to a considerable extent depended on the timely delivery/procurement of casualties at BMP and PMP.

First aid proved to be within different periods after the wound which depended mainly on the character/nature of locality, on combat and tactical conditions. With the offensive operations the periods of rendering of first aid considerably were shortened, since after rifle units moved the medical subunit of battalion and regiment.

Not all casualties needed aid at BMP and PMP, some were obtained here only in the following stages. Based on materials of the author's development of the histories of disease/illness, a quantity of casualties with the bullet break of the bones of shin, which obtained medical aid at BMP, composes 10.50/o. Remaining casualties, without being held up at BMP, were bound further. The significant part of the casualties related to the heavy ones and was delivered to stretchers; 19.40/o of casualties with the bullet break of the bones of shin were

delivered with the superimposed to the foot styptic tourniquet. At BMP 6.50/o the entered casualties was introduced the morphine, 18.50/o subcutaneously produced subbandaging of the stained with blood bandage, and in remaining casualties primary bandage was substituted new. The improvised immobilization was replaced by transport in 28.70/o of wounded, moreover into 4.60/o were superimposed the splints of Craser, in remaining 24.10/o used other splints.

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Based on materials of the author's development of the histories of disease/illness, 54.70/o of casualties with the bullet break of the bones of shin obtained medical aid at PMP, remaining, apparently did not need direct aid and therefore they were directed to DMP or in KhPPG of the first line.

At PMP the entered casualties was rendered first aid aid whose volume wholly depended on tactical combat situation.

Based on materials of the author's development of the histories of disease/illness, casualties with the bullet damage of the bones of shin at PMP in 2.30/o with the large blood losses and shock was produced the transfusion of blood and blood-substituting

fluids/liquids; into 39.0o/o was introduced subcutaneously the morphine, cardiac (camphor, caffeine), etc.; into 5.6o/o was produced cover anesthesia according to A. V. Viwnyovskiy; in 92.2o/o were subbandaged or changed primary bandages. From the presented data it is evident that the transfusion of blood and blood-substituting fluids/liquids, and also cover anesthesia with the breaks of the bones of shin was used comparatively infrequently, since they required not all casualties, but transferred significant blood loss or had symptoms of shock.

At PMP was filled the card of forward area, by casualty with the bullet break of bones shins introduced the antitetanus serum (1500 AE into 91.2o/o of cases and 3000 AE into 8.8o/o). Sometimes it were introduced at BMP. However, to the unit of the casualties antitetanus serum was not introduced, at least in the documents of the unit of the casualties of the reference about the introduction of serum it was not.

In 1941 antitetanus serum was introduced at PMP 46.3o/o casualties, in 1942 - 59.0c/c, in 1943 - 58.9o/o, in 1944 - 71.9o/o, in 1945 - 80.0o/o.

Antigangrenous serum was introduced at PMP 5.0o/o of casualties with the bullet break of the bones of shin with the suspicion to the

developing gaseous infection.

At PMP the styptic tourniquet with the bullet breaks of the bones of shin was laid by 2.3o/o of the casualties, who passed through PMP. The superimposed in the preceding stage tourniquet at PMP was removed/taken; but if hemorrhage was renewed, then was laid again. In many instances the repeated imposition of tourniquet was not required, and hemorrhage after the removal/taking of tourniquet was not renewed.

According to the data of the deepened development of histories the diseases/illnesses, in 1941 with the bullet breaks of the bones of shin in all stages tourniquet+ laid into 12.3o/o, in 1942 - into 7.2o/o, in 1943 - into 6.2o/o, in 1944 - into 8.7o/o and in 1945 - into 7.4o/o; on the average into 8.0o/o.

If one considers that the wound of vessels with the bullet breaks of the bones of shin was recorded into 14.9o/o, i.e., almost twice more frequently than was laid tourniquet, then, apparently primary hemorrhage with the wound of the vessels of shin was not always escorted/tracked by the significant external hemorrhage, which required the use/application of a tourniquet. Known numerous such cases when tourniquet was laid without sufficient to that bases. This was observed most frequently in the beginning of the war when the

medical workers yet did not have sufficient appropriate experiment/experience. Of all cases of the imposition of tourniquet (substantiated and not substantiated) most of all fall to the army area - 71.80/o, including 24.40/o - to the company, 6.60/o - at BMP, 32.80/o - at PMP and 8.00/o - at DMP. To the stop of repeated and secondary hemorrhages it is 12.20/o of all cases of applying the tourniquet; of them 5.00/o fall on FPG, 2.20/o - to the army evacuation hospital and 5.00/o - to the front line installations. A significant number of cases of the imposition of tourniquet (16.00/o) related to other stages (very probably, and to the therapeutic installations of army area).

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Thus, taking into account also these cases it is possible to say that not less than 3/4 all cases of applying the tourniquet is produced to the army area.

From a total number of casualties, bandaged at PMP, in 11.10/o with the shift/relief of bandages were applied the antiseptic; if we the use/application of all antiseptic substances take as 100, then in the fraction/portion of chlorcaine it is necessary to 54.9, Rivanol - 22.6 white streptocides - 12.9, A. V. Vinyovskiy's ointment - 3.2, potassium permanganate in the solution - 6.4.

The first and basic stage of the imposition of transport immobilization is PMP, where the transport splints were laid into 48.20/o of cases. In the remaining cases the immobilization was produced in BMP, DMP and other stages.

On the basis of the materials of the deepened development the periods of the imposition of transport immobilization after wound with the bullet breaks of the bones of shin in the different stages were following: 1 hour - 8.30/o, 2-6 hours - 23.20/o, 7 hours later - 68.50/o.

The periods of the imposition of transport immobilization depended on the character/nature of wound, quantity of casualties, periods of their delivery/procurement and working conditions at BMP and PMP. The imposition of transport splints with the bullet breaks of the bones of shin into the first hours after wound in quantity 31.50/o should be recognized sufficient, since from a number of all breaks of the bones shins 22.60/o fall to the perforated ones and the edge/boundary ones, which it was difficult to recognize in these stages.

The stay of casualties with the bullet break of the bones of

shin without the immobilization unfavorably influenced the general condition of casualty, the course and the healing of fracture, frequently causing severe complications in the form of shock, secondary hemorrhages, infection, etc.; therefore to early transport immobilization it attached much importance.

It is necessary to note that the immobilization with the bullet breaks of the bones of shin was realized within the different periods differentiated, depending on the form/species of the damaged bone, which can be judged from Table 211.

In the first twenty-four hours the immobilization was produced with bullet breaks of both bones of shin into 73.60/o, with the breaks of the tibia - into 63.10/c, fibular - into 55.00/o of cases. Hence it is possible to make the conclusion that the more complex the break of the bones of shin, the earlier was laid the transport immobilizing bandage.

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EXPERIENCE OF SOVIET MEDICINE IN A GREAT PATRIOTIC WAR 1941-1945--ETC(U)
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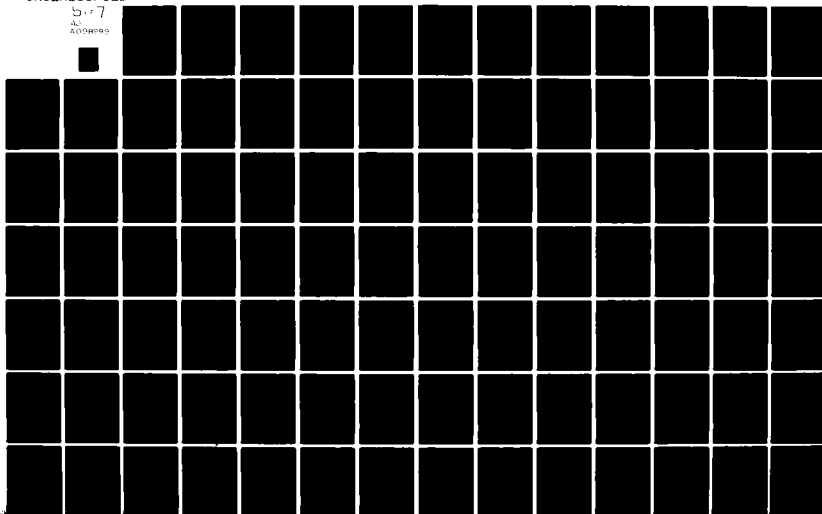


Table 211. Transport immobilization with the breaks of the different bones of shin (in percent).

(1) Наименование кости	(2) Время, истекшее после ранения до иммобилизации конечности			(6) Итого
	(3) 1 час	(4) 2 — 6 ча- сов	(5) 7 часов и позже	
(7) Большеберцовая	5,6	22,8	71,6	100,0
(8) Малоберцовая	2,5	18,6	78,9	100,0
(9) Обе кости голени	9,8	28,3	61,9	100,0

Key: (1). Designation of bone. (2). Time, which elapsed after wound before immobilization of extremity. (3). hour. (4). hours. (5). hours it is later. (6). Altogether. (7). Tibial. (8). Fibular. (9). Both bones of shin.

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This testifies about the correct preliminary classification of casualties on severity of wound, produced by medical personnel at and about easier diagnosis of break of both bones and one greater than one fibular, which has already been noted in the preceding chapter.

The substance of primary transport immobilization were all possible splints, with which in special sets they widely supplied the foremost points/posts of medical aid. The character/nature of utilization different ones of the types of splints can be judged from following data (Table 212).

The most widely used form/species of immobilization, thus, was wire splint. According to the experiment/experience it is possible with the authenticity to say that when the type of splint in the documents was not designated, in essence were applied wire splints. This makes it possible to make the conclusion that the wire splint was used almost into 3/4 cases of all bullet breaks of the bones of shin.

Significant part composed the gypsum splints (they were shown in a number of other ones), the frequency of their use/application decreasing with an increase in the severity of the break: with 16.80/o with the incomplete breaks to 7.10/o with those crushed, since fairly often with the incomplete breaks the first transport immobilization coincided with the therapeutic. Plywood splint in all forms of break was used almost equally frequently. Thus was not matter concerning the use/application of splints of Diederichs and Thomas-Vinogradov - the frequency of their use/application on the natural reasons increased/grew with an increase in the severity of break. The most rarely were used cross-linked and improvised splints, as not ensuring the sufficient fixation of break. The splint of Cramer turned out to be portable and the most convenient for the fixation of the bullet breaks of the bones of shin, in particular in

combination with the lateral plywood splints.

More rarely was used the proposed by V. M. Layshevskiy special transport splint for the bullet breaks of the bones of shin.

In the course the wars arrived at the conclusion that the best and most convenient for the transport fixation at the bullet break of the bones of shin was achieved by isposition on the foot of the posterior splint of Cramer to the buttock fold with the addition of two wire splints or plywood on each side.

Table 212. Substances of the transport immobilization of extremity with the different types of the breaks of the bones of shin (in percent).

(1) Шпны	(2) Вид перелома				(7) В среднем
	(3) дырчатый, краевой	(4) поперечный, продольный, косой	(5) оскольча- тый	(6) раздроб- ленный	
(8) Проволочные	43,0	42,0	39,1	39,3	40,4
(9) Дитерихса	0,9	1,4	1,2	2,2	1,3
(10) Томаса Виноградова	0,5	0,7	1,2	1,6	1,1
(11) Импровизированные и прочие	55,6	55,9	58,5	56,9	57,2
(12) Всего	100,0	100,0	100,0	100,0	100,0

Key: (1). Splints. (2). Form/species of break. (3). perforated, edge/boundary. (4). transverse, longitudinal, by sand bar. (5). fragmented. (6). crushed. (7). On the average. (8). Wire. (9). Diedrichs. (10). Thomas Vinogradov. (11). Improvised and other. (12). In all.

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As far as use/application is concerned of other types of splints, in particular, Thomas-Vinogradov's splint, then the latter had very limited practical application, apparently in view of its complexity in the absence of any advantages before the simpler splints - plywood and Cramer.

Primary surgical processing treatment of the bullet breaks of the bones of shin in an army area.

Lieutenant Colonel of medical service Ye. V. Pristupov.

Primary processing in the years of war, stages, fronts and individual combat operations/processes.

By the basic problem of the treatment of the bullet breaks of the bones of shin in the therapeutic installations, especially army and partially army area, was the timely primary surgical processing, to a considerable degree which determined clinical outcome. However, its action must be examined in the interconnection with the preceding and subsequent measures with stage treatment of casualties.

Were noted the oscillations/vibrations of the percentage of operability in different stages of the medical evacuation; however, general/common/total for all fronts of the Red Army was an increase in the percentage of operability by DMP and improvement from year to year of the quality of primary surgical processing.

Table 213 (according to the data of author's development) confirms this.

Especially noticeably it is raised operability at DMP, beginning from 1942, that it is necessary to connect with the stabilization of the greater unit of the fronts; because of this considerably was lowered the number of primary processings in the same period in army and front line KhPPG and evacuation hospitals.

In the beginning of war from every 100 those operated fall at DMP 52 casualties, in 1942 - already 74, and toward the end of the war - 83, this increase occurring in essence due to a descent in the percentage of those operated in KhPPG.

Graph/count the "General/common/total operability" of table 213 indicates an increase in the general/common/total operability of those wounded the shin with 48.5 in the beginning of war to 88.60/o in 1945.

Table 213. Distribution of casualties with bullet fracture of the bones of shin, which were subjected to primary surgical processing, according to ethanes of the medical evacuation during the individual years of war (in the percentages).

(1) (4) Этан Год	ДМП	ХППГ	(3) Армел- ский ЭГ	(4) Фронт- вой ЭГ	(5) ГЛР, тыловод ЭГ, прочие	(6) Итого	(7) Общая опера- тельность
1941	52.8	32.0	6.0	5.2	4.0	100.0	48.5
1942	74.3	20.7	2.1	0.9	2.0	100.0	66.4
1943	77.1	18.2	2.1	0.9	1.7	100.0	76.7
1944	80.6	14.1	2.1	0.9	2.3	100.0	81.7
1945	83.5	12.7	2.0	0.1	1.7	100.0	88.6
(8) В среднем...	77.2	17.2	2.3	1.0	2.3	100.0	75.6

Key: (1). Stage. (2). Year. (3). Army EG. (4). Front line EG. (5). GLR, rear EG, other. (6). Altogether. (7). Total operability. (8). On the average.

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Are exponential data along some fronts, relating at the beginning wars and explaining by the operational-tactical circumstances of that period (Table 214).

At the Western Front according to the tactical conditions our troops/forces in the first months of war withdrew up to the

significant distances, in this case in KhPPG it was operated by 44.10/o; on DMP - only 38.70/c. In Leningrad and especially in Karelian fronts, where rapidly was established/installed stable position/situation, the percentage of operability on DMP was considerably higher.

Are exponential some reference data, obtained from the materials of the medical reports of Karelian Front in the second half-year of 1942. In one of the armies, which was on the defensive, on all DMP on the average the operability of those wounded the shin composed 84.10/o. On all DMP of one of the armies in combat for the great onions (November - December of 1942) the operability with the bullet breaks of the bones of shin was lowered to 61.80/o with the large intensity/strength of work.

It is interesting to compare the information about operability and distribution of casualties with the bullet break of the bones of shin in the stages, in which was performed primary surgical processing in the period of the large-scale advance operation/process of N front in 1945. Operability during this operation/process composed 89.60/o. However, as a result of the rapid advance of the troops/forces at DMP it was forward operated altogether only by 49.50/o; the significant part of the casualties (30.20/o) operated in the army therapeutic installations, of them 25.60/o - in KhPPG, which

pushed forward to the line of DMP in order to give the latter possibility to follow the troops/forces, without blowing away from them; the remaining 9.90/c of casualties were operated in the front line therapeutic installations.

Given data with the entire obviousness confirm the dependence of the medical evacuation provision of casualties on the combat situation and testify about a steady increase in the organization in the work of our medical service in the course of war.

In the period of active combat operations to subject to the surgical processing of all needing it casualties, who entered DMP, did not manage; furthermore, frequently readings/indications to the processing appeared not into the first hours after wound, but after certain time; therefore from a number of casualties, who passed through DMP and not processed not it (31.70/o), unit of them (9.30/o) was treated in the following stages: 7.50/o in KhPPG and 1.80/o in the army and front line evacuation hospitals.

Table 214. Distribution of casualties with the bullet break of the bones of shin, which were subjected to primary surgical processing, in the stages of the medical evacuation at the individual fronts in 1941 (in the percentages).

(1) Фронт	(2) Этап					(3) Итого
	ДМП	ХППГ	(4) Армей- ский ЭГ	(5) Фронт- вой ЭГ	(6) ГЛР, ты- ловой ЭГ, и прочие	
(7) Западный	38,7	44,1	7,5	5,4	4,3	100,0
(8) Юго-Западный	43,5	34,8	13,1	4,3	4,3	100,0
(9) Ленинградский	68,0	17,0	7,5	7,5	2,0	100,0
(10) Карельский	70,8	20,8	—	—	8,4	100,0

Key: (1). Front. (2). Stage. (3). Altogether. (4). Army EG. (5). Front line EG. (6). GLR, rear EG, other. (7). Western. (8). South-zanaldny1. (9). Leningrad. (10). Karelian.

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From a number of those casualties who entered, passing DMP, directly in KhPPG, it was processed in this stage 61.40/o, while from remaining 38.60/o they were treated in the subsequent stages only 1.80/o. Consequently, the overwhelming majority of casualties which showed primary surgical processing, it was operated in the first whereas therapeutic installation into which they entered from the zone of combat operations.

Based on materials of one of MSB (chief/leading surgeon V. I.

Titus) of Leningrad Front, in 3 years of stable defense, including the release of Leningrad region, operability with the bullet breaks of the bones of shin over the years was the following: the first year - 39.3o/o, the second year - 83.3o/o, the third year - 76.8c/c.

However, during the offensive operations (September - October of 1942, the area of Neva Dubrovka) operability was raised to 90.5c/o and even to 94.4o/o. During April 1944 during combat on the near routes of approach to Pskov the operability achieved 96.3o/o.

Given general/common/total data and individual examples make it possible to conclude that as a whole within the period of the Great Patriotic War more than 3/4 casualties with the bullet break of the bones of shin were operated at DMF, moreover sometimes operability at DMF achieved 96.3o/o.

Significant interest are of comparative data on the periods of conducting primary surgical processing and in particular in the period of two combat operations/processes: Germans' rout under the Moscow (October - December of 1941) and the taking of Berlin (April - May of 1945). The operability of casualties with the bullet break of the bones of shin increased with 49.3 (rout of the Germans in the environs of Moscow) to 78.4o/o (taking of Berlin, a number of treated in the first twenty-four hours grew from 56.8 to 87.1o/o.

Of 87.10/o of those operated in the first twenty-four hours in Prussian operation/process 57.10/o they arrived for the first 10 hours, of them large part for the periods from 4 to 10 hours, while during the rout of the Germans in the environs of Moscow of 56.80/o of those operated in the first twenty-four hours for the first 10 hours it was necessary only to 28.50/o. Given data attest to the fact that the qualified surgical aid during the taking of Berlin proved to be considerably more rapid than it is found in direct dependence on the early periods of the carrying out/removal of casualties from the field of combat and rendering by it of first aid.

Readings/indications to the primary surgical processing.

The totality of all signs of the wound of shin is determined by the form/species of the wounding shell, by its ballistic properties, degree of the pliability/compliance of tissues and by direction of wound canal.

Thus, the insignificant according to the external form/species wounds, plotted/applied by the fine/small fragments of shell, were escorted/tracked sometimes by the extensive crushings of muscles, tendons, bones, vessels and nerves of shin against the background of

the general/common/total contusion of tissues, the form of wound canal was frequently zigzag, which complicated alignment in the wound. At the same time sometimes large external wounds were escorted/tracked by the relatively insignificant decomposition of bone. Had value and direction of the flight of the wounding shell; so, front-posterior wounds which composed, according to I. A. Zvorykin, 15.40/o of all wounds of shin, and according to I. S. Zhorov, 23.60/o, during the damages of bones they led to the extensive crushing of the muscles of posterior leg not only with the wounding shell, but also by the fragments of bone.

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Correct diagnosis and decision/solution of a question about the readings/indications to the primary surgical processing depended on the proficiency of surgeon and on the accounting to them of all special features/peculiarities of wound, break, and also medical circumstances.

The form/species of the wounding shell, besides other, by itself to a considerable degree determined the frequency of surgical interventions: from a number of casualties by bullet there was treated 69.00/o, and from a number of casualties by the fragment of shell, mine and so forth - 81.70/o, whereas the casualties by

antipersonnel mine were processed everything.

Value which is not smaller had the character/nature of wound channel (Table 215).

Hence it follows that the operability above all was with the fragmentation blind-end wounds; the smallest operability was with the tangential bullet wounds.

Are especially heavy were heavy the wounds, caused by the burst of antipersonnel mine and explosive/bursting bullet. So, according to data of the author's development of the histories of disease/illness, among the wounds by antipersonnel mine into 3/4 cases were noted disengagement or crushing, required amputations. Most frequently suffered the extremital department of shin. On thirds of shin these wounds were distributed as follows: upper third - 15.50/o, average - 23.00/o and lower - 61.50/o.

For the characteristic of the severity of these wounds it is possible to give the following observation.

M.V.N., 24 years, is wounded 6/IV 1945 by antipersonnel mine.

Diagnosis: the incomplete disengagement of left shin in lower

third, the break of left fibular bone, the closed break of left femoral bone, closed fracture of right shin, wound of both eyes by the burst of trotyl. At DMP he entered 9 hours after wound in the condition of shock. Under ether anesthesia is produced the amputation in lower third of left shin; the stump of shin and left thigh are immobilized by wire splint with the gypsum annuli; wire splint is superimposed also to the right shin. Are introduced 1500 units of antitetanus and 5000 units of antigangrenous serum.

8/IV entered in KhPPG in the condition of average/mean severity, the pulse of 98 strikes/shocks per minute, stump in the satisfactory condition, swelling of right shin. Temperature within 37.2-37.9°. Made the transfusion of the conserved blood 400 ml and the fluid/liquid of I. R. Petrov 500 ml 12/IV are superimposed gypsum bandages to the left and right extremity.

15/IV entered SEG. The general condition satisfactory, temperature is normal.

Table 215. Operability of casualties with bullet break of the bones of shin in the dependence on character/nature and means of wound (in the percentages).

(1) Вид ранения	(2) Характер ранения			(3) В среднем (включая размозжили и прочие)
	(4) слепое	(5) сквозное	(6) касательное	
(7) Пулевое	78,8	67,9	59,1	69,0
(8) Осколочное	80,7	79,6	66,9	81,7
(9) В среднем	80,4	72,2	64,9	75,6

Key: (1). Means of wound. (2). Character/nature of wound. (3). On the average (including crushing and simple). (4). blind. (5). through. (6). tangent. (7). Bullet. (8). Fragmentation. (9). On the average.

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X-ray examination. Break of middle third of left thigh with the displacement of broken ends, on the right shin - oblique comminuted fracture of tibia bone with the incomplete separation/section of large/coarse fragment, the small displacement of basic broken ends.

Movements in the knee and hip joint fully.

Analysis of the blood from 1/VII 1945: hemoglobin 73o/o, ROE of 10 mm an hour, erythrocytes 4800000, leukocytes 4000. 10/VII 1945 it is converted into the hospital for prosthetics and after obtaining of prosthesis it is discharged.

To this casualty with the severe multiple trauma timely amputation from the primary readings/indications was completely appropriate and contributed subsequently to smooth clinical course.

All wounds of shin by antipersonnel mine were characterized by the extensive crushing of soft tissues with the introduction of

foreign bodies (unit of the mine, the pieces of clothing, foot-wear, the lumps of the earth/ground, etc.).

Wounds by the explosive bullet led to the extensive internal damages of tissues with the introduction of metallic fragments into the thickness of muscles, and frequently also into the bone. Into 82.10/o it was necessary to surgical treat them.

Operability little depended on the level of the wound of shin; so, with the wounds upper third it composed 75.40/o; middle third - 80.30/o and lower third - 70.50/o.

Operability to a considerable degree depended on localization and form/species of break (table 216).

The degree of the decomposition of bone, according to these data, has certain effect on the frequency of surgical interventions. However, in accordance with the degree of the damage of bones and soft tissues average/mean operability during the isolated/insulated damages to fibular and tibia was almost identical and considerably it increased/grew during damages of both bones of shin.

Consequently, the form/species of break as the form/species of the wounding shell, was not the only decisive factor during the

establishment of readings/indications to the primary surgical processing. Basic reading/indication to it was the totality of the damage of all tissues and mainly the massiveness of the damage of bones and vessels.

The data about the frequency of primary surgical processing in the stages of the medical evacuation depending on the form/species of the break are represented in Table 217.

Table 216. Operability of casualties with the bullet break of the bones of shin according to localization and form/species of break (in the percentages).

(1) Локализация перелома	(2) Вид перелома	(3) Дыр- чатый	(4) Крае- вой	(5) Попереч- ный и продоль- ный	(6) Косой	(7) Раздроб- ленный	(8) Крупно- и мелко- осколь- чатый	(9) В сред- нем
(10)								
Малоберцовая кость . . .		65.8	68.5	68.1	67.3	79.4	72.9	71.5
(11) Большеберцовая . . .		67.6	68.4	62.5	69.6	80.6	77.0	71.2
(12) Обе кости		63.2	—	76.6	75.5	90.1	77.2	83.7
(13) В среднем (в том числе неизвестно)		67.2	69.3	68.0	70.4	87.5	75.8	75.6

Key: (1). Localization of break. (2). Form/species of break. (3). Perforated. (4). Edge/boundary. (5). Cross and longitudinal. (6). By sand bar. (7). Crushed. (8). Large (small-splintered. (9). On the average. (10). Fibula bone. (11). Tibia. (12). Both bones. (13). On the average (among other things it is unknown).

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Table 217 is comprised according to the sign of the distribution of those operated in the stages of evacuation; therefore the high percentage of operations/processes on DMP is explained, first of all, by the fact that in this stage was operated the generally large part of the casualties, including with the perforated and edge/boundary breaks, although the specific gravity/weight of the latter in a total quantity of operated at DMP was small.

Table 217. Distribution in the stages of the evacuation of the casualties, who were subjected to primary surgical processing, in the various forms of the breaks of the bones of shin (in the percentages).

(1) Этап	(2) Вид перелома	(3) Дырчатый и краевой	(4) Поперечный, продольный, косой	(5) Раздроб- ленный	(6) Крупно- и мелко- оскольчатый
ДПМ		80.0	73.4	77.2	77.4
ХППГ		14.3	20.2	17.5	16.2
(7) Армейский эвакуацион- ный госпиталь		2.3	1.8	2.5	2.4
(8) Фронтальной эвакуацион- ный госпиталь		0.9	1.2	0.4	1.5
(9) ГЛР, тыловой эвакуацион- ный госпиталь, прочие		2.5	3.4	2.4	2.5
(10) Всего		100.0	100.0	100.0	100.0
(11) Не оперировано		31.3	30.8	12.5	24.2

Key: (1). Stage. (2). Form/species of break. (3). Perforated and edge/boundary. (4). Cross, longitudinal, by sand bar. (5). Crushed. (6). Large/coarse and small-splintered. (7). Army evacuation hospital. (8). Front line evacuation hospital. (9). GLR, rear evacuation hospital, other. (10). In all. (11). Not operated.

Periods of primary surgical processing.

Are very important while conducting of the primary surgical processing of the bullet breaks of the bones of shin periods from the

moment/torque of wound. They are very exponential both with the organizational and from a clinical point of view.

As can be seen from Table 217, almost 3/4 casualties from the heavy ones by the crushed break were operated in the first twenty-four hours, and their 1/5 unit - for the first 6 hours, which indicates their rapid carrying out/removal from the field of combat.

In the first place on the early (6 hours) periods of operations/processes stood edge/boundary breaks. The delivery/procurement of casualties with this form/species of break from the field of combat did not present difficulties, since in significant a number of cases they did not lose the capability independently to be moved.

Taking into account that presented, becomes clear and certain delay with conducting of the primary surgical processing of other forms/species of break - oblique, cross and fragmented. Casualties with one of these means of the bullet damages of bones shins delivered from the foremost stages (PNP) usually in the second burst, and therefore even were treated then more lately.

Procedure, technology character/nature of primary surgical processing.

Changing to the description of procedure and primary surgical of processing technique, it is necessary to note the following.

The primary surgical processing of the bullet breaks of the bones of shin pursued the target of cutting, spreading wound in accordance with degree and size/dimension of the damage of tissues, and also cutting all over the crushed nonvital tissues, which are substrate for the development of infection. These elements of primary surgical processing were necessary in different volumes and combinations during processing of any wound of shin. Depending on the degree of violation the integrities of bones, of large vessels, presence in tissues of foreign bodies, splitting up and carving were matched with additional interventions (removal/distance of bone fragments and foreign bodies, the dressing of vessels, etc.).

From this point of view for the correct determination of the character/nature of primary surgical processing it is possible to secrete the following three groups of the bullet breaks of the bones of shin.

First group - small wounds of soft tissues with the

insignificant damage of bones (with the linear, perforated, edge/boundary defect) in the absence of bone fragments or with their insignificant quantity. This group included simple breaks (cross, longitudinal and oblique) and the so-called incomplete (perforated and edge/boundary breaks).

In the overwhelming majority of the cases primary surgical processing in this case was reduced to splitting up and carving of skin wound and subject soft tissues.

With multiple failure of large vessels was produced their dressing in the wound and it is rare for the elongation/extent.

Table 218. Periods of primary surgical processing in the various forms of the break of the bones of shin (in the percentages).

(1) Вид перелома	(2) Срок обработки	(3) Первые сутки				(7) Итого	(8) Поз- же суток	(9) Всего
		(4) до 6 часов	(5) от 7 до 12 часов	(6) от 13 до 24 часов	(6) часы не указаны			
(10) Дырчатый		18,4	21,2	21,2	9,6	70,4	29,6	100,0
(11) Краевой		21,9	18,9	19,7	10,2	70,7	29,3	100,0
(12) Поперечный и продоль- ный		15,9	11,5	18,6	18,6	64,6	35,4	100,0
(13) Косой		15,0	20,9	20,3	12,3	68,5	31,5	100,0
(14) Раздробленный		21,7	19,9	16,9	14,6	73,1	26,9	100,0
(15) Крупно- и мелкоосколь- чатый		16,6	18,1	19,8	11,6	66,1	33,9	100,0
(16) В среднем. . .		18,6	18,9	19,2	12,3	69,0	31,0	100,0

Key: (1). Form/species of break. (2). Period of processing. (3). First day. (4). to 6 hours. (5). from 7 to 12 hours. (6). hours are not indicated. (7). Altogether. (8). It is later than days. (9). In all. (10). Perforated. (11). Edge/boundary. (12). Cross and longitudinal. (13). By sand bar. (14). Crushed. (15). Large/coarse and small-splintered. (16). On the average.

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The second group composed wounds, with which, together with different degree of the damage of soft tissues, occurred the significant decomposition of bone by the wounding shell in the form of the large/coarse and small-splintered and crushed breaks, but

without the damage of large vessels.

With this heavy form of the break of the bones of the shin of one processing of soft tissues it was insufficient; it was necessary to remove the free among the muscles bone fragments, and sometimes to treat the sharp/acute broken ends of bones, showing under the skin.

The third group includes the extensive wounds of shin, which are escorted/tracked by the disengagement of its extremital department, or the crushed breaks with crushing of soft tissues and damaging of large vessels and nerves. If the lack of vitality of extremity did not cause doubts, then was used amputation from the primary readings/indications.

Before beginning the primary surgical processing, it was necessary to evaluate from a clinical point of view both the general condition of casualty and the degree of the local damages of tissues; consequently, at each specific case was evaluated not only the wound, but also the general condition of casualty and entire/all totality of the symptoms, caused by wound. The condition of shock, hemorrhage from the large vessels or suspicion to the anaerobic infection determined surgeon's tactics in each individual case in the sense of period and form/species of surgical intervention, selection of method anesthetization, etc.

The technical side of conducting primary surgical processing also required attention. The arrangement of casualty to the table had to ensure the smallest traumatization of extremity and convenience in the operation; for this were used different improvised substances (rolls, support/socket, etc.); however, most modern was operation on the orthopedic table, which was used extensively in the specialized hospitals and could not find, on the clear reasons, uses/applications at DMP and in KhPPG of the first line.

Anesthetization. As showed experiment/experience, the primary surgical processing of the bullet breaks of the bones of shir was very complex surgical intervention, which requires unconditionally full/total/complete anesthetization and at the same time of strict economy of time. Observance of both these conditions was not always possible with the local anesthetization, especially at DMP and in KhPPG of the first line where was produced bulk of surgical interventions.

Depending on the general condition of casualty, character/nature of wound and equipment status of therapeutic installation were used different forms/species of anesthetization (Table 219).

Table 219. Form/species of anesthetization during the primary surgical processing of casualties with the bullet break of the bones of shin (in percent).

(1) Группа раненых	(2) Вид обезболивания							(10) Итого
	(3) мест- ное	(4) спин- но- мозго- вое	(5) хлор- эти- ловое	(6) эфир- ное	(7) хлор- этил- эфир- ное	(8) гексе- нало- вое	(9) про- чие	
(11) Все раненые, подвергшиеся первичной хирургической								
(12) обработке	51.2	2.9	27.8	11.5	5.1	0.8	0.7	100.0
Ампутированные при первич- ной обработке	20.0	0.2	24.4	36.5	13.7	1.8	3.4	100.0

Key: (1). Group of casualties. (2). Form/species of anesthetization. (3). local. (4). cerebrospinal. (5). chloroethyl. (6). ether/ester. (7). chloroethylether/ester. (8). hexobarbital. (9). other. (10). Altogether. (11). All casualties, who were subjected to primary surgical processing. (12). Amputated during primary processing.

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As can be seen from given data, local anesthetization was used more than in half of all operations/processes, most frequently in the form of infiltration anesthesia; comparatively rarely was used cover anesthesia, which recommended with the extensive wounds N. N. Petrov. This anesthesia technique on the shin is sufficiently simple and is realized with the aid of two after pricking on the edges of the tibia and third injection in the region of fibular bone. Many surgeons (M.

N. Akhutin, S. I. Banaytis, S. S. Girgolav, N. N. Yelanskiy) considered it worthwhile to begin operation/process from chloroethyl stupefaction with the march/passage in the case of necessity to ether anesthesia.

Inhalation anesthesia found use only in 44.40/o, including into 27.80/o was used chloroethyl stupefaction. Very rarely - only into 0.80/o - during the primary surgical processing was used hexobarbital anesthesia. I. A. Krivorotov successfully locally used hexenal simultaneously with the anesthesia by novocaine, adding 10 cm³ 10.00/o solution of hexenal to 100 cm³ 0.250/o of novocaine. Of 52 cases of such anesthetization with the wounds of lower extremities in 42 cases advanced full/total/complete sleep, in 7 cases the sleep was incomplete and in 3 cases of sleep did not advance.

The relationships/ratios of the methods of anesthetization upon the amputations considerably differed from average numerals with all operations/processes toward an increase in the number of cases of general/common/total anesthetization - from 45.90/o with all operations/processes to 79.80/o upon the amputations; frequently (24.40/o) for the production of amputation it was sufficiently one chloroethyl stupefaction.

On the selection the method of anesthetization exerted a

substantial influence the form/species of break (Table 220).

Most frequently local anesthetization they put to use with the perforated and edge/boundary breaks and most rarely with those crushed. Chloroethyl and chloroethyl-ether/ester anesthesia most frequently was used with the cross, longitudinal and oblique breaks. With perforated, edge/boundary and comminuted fractures the general/common/total anesthetization was from 33.4 to 35.40/o of all cases of anesthetization. Cerebrospinal anesthesia was used most frequently with comminuted fractures (8.20/o), also, in the unitary cases with all remaining forms/species of break.

Character/nature of primary surgical processing. The given below table reflects the character/nature of primary surgical processing on the calendar years of war in different stages of the medical evacuation (Table 221).

Table 220. Distribution of casualties according to the form/species of anesthetization with different forms/species of the break of the bones of shin in the percentages).

(1) Вид перелома	(2) Вид обезболивания						(9) Всего
	(3) местное	(4) спинно- мозговое	(5) хлор- этиловое	(6) хлор- этил-эфир- ное	(7) эфирное	(8) прочие	
(10) Дырчатый, крае- вой	64.2	0.4	27.2	1.7	4.5	2.0	100.0
(11) Поперечный, про- дольный, косой	52.2	—	36.3	2.6	7.5	1.4	100.0
(12) Крупно и мелко- оскольчатый . .	55.4	8.2	24.0	5.4	6.0	1.0	100.0
(13) Раздробленный . .	34.8	0.3	26.3	9.2	24.6	4.8	100.0

Key: (1). Form/species of break. (2). Form/species of anesthetization. (3). local. (4). cerebrospinal. (5). chloroethyl. (6). chloroethyl-ether/ester. (7). ether/ester. (8). other. (9). In all. (10). Perforated, edge/boundary. (11). Cross, longitudinal, by sand bar. (12). It is large/coarse and small-splintered. (13). Crushed.

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Thus, the percentage of simple interventions (splitting up and splitting up with the carving) from year to year descended (from 62.9 in 1941 to 51.1 in 1945) due to certain increase in the percentage of more complex interventions, including amputations.

A number of those of entirely not treated within the time of war decreased more than three times.

Surgeons' increasing activity during the war, besides gaining of experience, is explained by certain increase in the severity of the wounds: thus, for instance, quantity of fragmentation wounds was increased with 50.5 (first year of war) to 59.30/o (fourth year), and a quantity of bullet ones in accordance with this decreased from 49.5 to 40.70/o; a quantity of associated wounds also was increased with 16.3 (first year) to 27.80/o (fourth year); to a lesser degree this affected an increase in the severity of a quantity of breaks (Table 222).

Together with an increase in the quantity of crushed breaks was noted a descent in the quantity of comminuted fractures almost to the same value. The difference in the numerals is obtained small; however, it is necessary lot, that on the clinical course and the outcomes the crushed breaks were sany times heavier than fragmented ones.

Table 221. Distribution of casualties according to the character/nature of primary surgical processing and the years of war (in the percentages).

(1) Год (календарный)	(2) Характер обработки	(3) Рассечение и рассечение с иссечением					(4) Ам- путация	(5) Всего
		(6) без дру- гих вме- шательств	(7) с пере- вязкой сосуда	(8) с удале- нием инород- ных тел	(9) с удале- нием костных осколков	(10) с прочи- ми вме- шатель- ствами ¹		
1941		62,9	2,0	6,8	15,5	0,8	12,0	100,0
1942		60,0	2,7	4,9	14,8	6,5	11,1	100,0
1943		57,3	3,2	4,6	16,2	6,4	12,3	100,0
1944		54,8	4,6	4,8	18,1	3,5	14,4	100,0
1945		51,1	5,1	6,9	20,3	2,6	14,0	100,0
(11) В среднем...		57,1	3,7	5,0	16,2	5,4	12,6	100,0

Key: (1). Year (calendar). (2). Character/nature of processing. (3). Splitting up and splitting up with carving. (4). Amputation. (5). In all. (6). without other interventions. (7). with dressing of vessel. (8). with removal/distance of foreign bodies. (9). with removal/distance of bone fragments. (10). with other interventions ¹.

FOOTNOTE ¹. In this graph are included the cases when was performed the "matched processing", processing the fragments of bone and cases when the means of processing was not established/installed.

ENDFOOTNOTE.

(11). On the average.

Table 222. Frequency of the comminuted and crushed fractures of the bones of shin on the years of war (in the percentages).

(1) Вид перелома	(2) Год войны			
	(3) первый	(4) второй	(5) третий	(6) четвертый
(7) Оскольчатый	48,7	45,5	40,7	39,1
(8) Раздробленный . . .	19,9	22,7	22,6	24,2

Key: (1). Form/species of break. (2). Year of war. (3). the first.
 (4). the second. (5). the third. (6). the fourth. (7). Fragmented.
 (8). Crushed.

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By the calendar years of war is determined the following dynamics of relationships/ratios among so-called simple interventions toward an increase in the specific gravity/weight of "splitting up" with respect to the operations/processes of "carving". Thus, to every 100 operations/processes of these two means of processing splitting up composed in 1941 65.2o/o, in 1942 - 79.8o/o, in 1943 - 87.2o/o. Since 1944 is noted certain descent in the percentage of splitting up to 79.5, and in 1945 - to 74.4. Thus, relationship/ratio was expressed in 1941 on the average as 2:1, into 1942 and 1944 - as 4:1,

and at the end of the war - as 3:1, i.e., was given certain preference to the method of splitting up.

Is of significant interest the procedure of primary surgical processing in different stages of the medical evacuation - from the army to the front line area (Table 223).

Thus, in more than half of all cases primary surgical processing, especially on DMP and in KhPPG, it was reduced to simple splitting up or in the combination with the carving. The specific gravity/weight of the dressing of vessels during the primary surgical processing was more at DMP (4.2g/cc) and descended to 1.9g/cc in the front line evacuation hospitals. This bears out the fact that to the final stop of hemorrhage in the army area was given sufficiently attention. Thus, of 100 cases of the dressing of vessels 85 were produced at DMP, 10 - in KhPPG and 5 - in other stages.

From DMP to the army evacuation hospital a number of amputations was increased. This is explained by the fact that severe transportable casualties for the rendering to the specialized aid they more frequently evacuated into KhPPG and army evacuation hospitals, passing DMP.

The distribution of casualties according to the character/nature

of primary surgical processing in connection with the level of the break of the bones of shin is represented based on materials of the author's development of the histories of disease/illness in Table 224.

As can be seen from Table 224, with the wounds in lower third of shin the amputations were encountered almost two times more frequently than in upper third, and almost three times it is more frequently than in middle third. This is explained by a large number of disengagements and crushings of shin in lower third.

Table 223. Distribution of casualties with the bullet break of the bones of shin according to the character/nature of primary surgical processing in the stages of the medical evacuation (on the author's development in the percentages).

(1) Этап	(3) Рассечение и рассечение с иссечением					(4) ампутация	(5) Всего
	(6) без других вмешательств	(7) с перевязкой сосудов	(8) с удалением инородных тел	(9) с удалением костных осколков и обработкой фрагментов кости	(10) с прочими сочетанными вмешательствами		
111) ЛППГ	38.7	4.2	5.1	15.0	4.7	12.3	100.0
(12) Армейский эвакуационный госпиталь	39.1	2.2	4.6	15.6	5.0	13.5	100.0
(12) Фронтальный эвакуационный госпиталь	51.7	3.4	6.8	19.5	—	18.6	100.0
(12) Фронтальный эвакуационный госпиталь	50.1	1.9	11.5	20.0	8.8	7.7	100.0

Key: (1). Stage. (2). Character/nature of primary surgical processing. (3). Splitting up and splitting up with carving. (4). amputation. (5). In all. (6). without other interventions. (7). with dressing of vessels. (8). with removal/distance of foreign bodies. (9). with removal/distance of bone fragments and processing of fragments of bone. (10). with other and matched interventions. (11). Army evacuation hospital. (12). Front line evacuation hospital.

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With the wounds by average third dressing of vessels were produced somewhat more frequently than with the wounds upper and

lower third.

The character/nature of primary surgical processing with the breaks of the individual bones of shin is represented in Table 225.

During the damages to fibular bone most frequently (into 72.7%) were used splitting up and carving of soft tissues and it is considerably less frequent than during the damages of other bones, were removed bone fragments. Amputations during the isolated/insulated damages to fibular or tibia were produced in the small percentage of the cases (from 0.3 to 0.5) in contrast to break of both bones when the percentage of amputations achieved 32.5.

If with the "simple" forms/species of the break of bones it was not noted significant oscillations/vibrations in percentage relationship/ratio of the character/nature of primary surgical processing, then with the "compound" fractures of the bones of shin these oscillations/vibrations were expressed very sharply (Table 226).

With comminuted fractures splitting up and carving comprised more than half of all operations/processes; high percentage were splitting up and removal/distance of bone fragments with the low percentage of amputations. With the crushed breaks of amputation they achieved very high percentage - 49.1. Consequently, the crushing of the bones of shin must be referred to the heaviest breaks.

Table 224. Distribution of casualties according to the character/nature of primary surgical processing in connection with the level of the wound of shin with the bullet breaks (in the percentages).

(1) Уровень ранения по третям	(2) Характер обработки				(3) Всего
	(4) рассечение, посечение	(5) рассечение, иссечение, перевязка сосудов	(6) ампутация	(7) прочие	
(8) Верхняя треть	59.8	3.3	10.2	26.7	100.0
(9) Средняя	59.6	4.2	7.6	28.6	100.0
(10) Нижняя	53.4	3.6	19.2	23.8	100.0

Key: (1). Level of wound on third. (2). Character/nature of processing. (3). In all. (4). splitting up, carving. (5). splitting up, carving, dressing of vessels. (6). amputation. (7). other. (8). Upper third. (9). Middle third. (10). Lower third.

Table 225. Distribution of casualties according to the character/nature of processing with the breaks of the individual bones of shin (in the percentages).

(1) Название поврежденной кости	(2) Характер обработки					(2) ампутация	(4) Всего
	(5) рассечение и рассечение с иссечением						
	(6) без других вмешательств	(7) с перевязкой сосудов	(8) с удалением инородных тел	(9) с удалением костных осколков и обработкой фрагментов кости	(10) с прочными и сочетанными вмешательствами		
(11) Малоберцовая	72.7	4.5	7.2	13.4	1.7	0.5	100.0
(12) Большеберцовая	67.7	3.2	6.5	19.8	2.5	0.3	100.0
(13) Обе кости	36.5	4.8	2.1	22.1	2.0	32.5	100.0

Key: (1). Name of the damaged bone. (2). Character/nature of processing. (3). amputation. (4). In all. (5). splitting up and splitting up with carving. (6). without other interventions. (7). with dressing of vessels. (8). with removal/distance of foreign bodies. (9). with removal/distance of bone fragments and processing of fragments of bone. (10). with other and matched interventions. (11). Fibular. (12). Tibial. (13). Both bones.

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Surgical processing of soft tissues. This means of surgical intervention composed 65.80/o of all primary surgical operations/processes. It encompassed predominantly splitting up of skin wound, fascias and muscles on the course of wound canal; less frequent splitting up was matched with the carving, the simultaneous removal/distance of foreign bodies and the dressing of vessels. Between splitting up and carving of the most frequently crushed, nonvital tissues not only it was not done sharp demarcation (which was not not not always clearly documented in the histories of disease/illness), but there was used, as a rule, in the combination, and they supplemented each other depending on the appearance of wound and wound canal. In the beginning of war it was necessary to encounter the incorrect understanding by some surgeons of the essence of splitting up and carving. Carving in the form of "five-kopek

coins" on the skin was especially irrational on the front of shin and frequently it was matched with insufficient splitting up of fascias and winding wound canal among the posterior muscles of shin. In the course the wars began to extensively use the disclosure/expansion of muscular pockets, the imposition of contra-apertures for the provision of free outflow of discharge from the wound and the removals/distances of intermuscular hematomas.

For the imposition of contra-apertures were used the sections/cuts between the medial and posterior surface, and also over lateral surface of shin.

In accordance with the topographic-anatomic special features/peculiarities of shin its anteromedial surface is barely suitable for the carving. On the posterior surface of possibility these are considerably wider. In view of the separation of abundant muscular mass of rear bed by fascial partition/septum into two departments - front/leading and posterior undoubtedly necessary was thorough splitting up and the carving of tissues on the posterior surface of shin. The wounds of this department of shin, according to I. A. Zvorykin, were observed in 80.60/o with respect to all wounds. For the sufficient disclosure/expansion of wound the sections/cuts here, as a rule, had to be considerably longer than on the front face, achieving 10 and more than centimeters.

The periods of surgical processing from the moment/torque of wound were dissimilar for splitting up and carvings (Table 227).

During the first day the carving was produced more frequently than splitting up, and beginning from the second day more frequently it was used one splitting up.

For the example of the wounds when it was possible to manage only with splitting up of wound, is given the following observation.

Table 226. Character/nature of primary surgical processing with the comminuted and crushed fractures of the bones of shin (in the percentages).

(1) Вид перелома	(2) Характер обработки	(3) Рассечение и иссечение	(4) Рассечение, иссечение				(5) Итого	
			(6) с перевязкой сосудов	(7) с удалением инородных тел	(8) с удалением костных осколков и обработкой фрагментов	(9) ампутация		(10) прочие
(11) Оскольчатый		60,2	3,8	5,2	24,8	0,7	5,3	100,0
(12) Раздробленный		25,6	3,7	1,4	14,7	49,1	5,5	100,0

Key: (1). Form/species of break. (2). Character/nature of processing. (3). Splitting up and carving. (4). Splitting up, carving. (5). Altogether. (6). with dressing of vessels. (7). with removal/distance of foreign bodies. (8). with removal/distance of bone fragments and processing of fragments. (9). amputation. (10). other. (11). Fragmented. (12). Crushed.

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D. R., 20 years, is wounded 22/XII 1943. In the company sector is superimposed the bandage. Entered ^{BMP} after 1 hour 30 minutes from the moment/torque of wound, and DMP - through the days. Diagnosis after the entry: the perforating bullet wound of right shin in middle third with the damage to the tibia. The general condition of casualty satisfactory, inlet on the internal surface of shin by the

size/dimension 1x1 cm, exit on the external surface several larger than sizes/dimensions, it bleeds. Under the local anesthesia is produced splitting up of outlet and ligation of vessels; is superimposed splint. Evacuation to the evacuation point, whence in the satisfactory condition it is directed to the front line evacuation hospital.

29/XII 1943 of wound with moderate suppurative discharge, granulate, movements in the talocrural joint are morbid; is superimposed the gypsum cast: is assigned Streptocid inward. Further course is smooth. With 3/II 1944 it walks on the crutches.

With roentgenoscopy of the shin 9/II 1944 is established/installed a comminuted fracture of the tibia in middle third.

Analysis of the blood: Hb 70o/o, l. 4000; p. 20/o, s. 51o/o, lymphs. ³² 30o/o, mon. 9o/o, e.b. 0/o: ROE 10 mm an hour.

Were used bandages, sollux, therapeutic exercise. With 17/II 1944 it walks, without putting to use support, slightly it limps. 15/III 1944 are superimposed secondary sutures. 12/IV upon the inspection/examination it is revealed, that the scars of right shin got stronger. It was discharged in a good condition.

General/common/total duration of the treatment of 112 days.

In this case, in view of the insignificant damage of soft tissues, it is completely appropriate it was appropriate to be restricted during the primary surgical processing by splitting up only of exit wound, which ensured subsequently smooth course.

The following observation illustrates the need for more complex processing.

R.P., 32 years, is wounded 23/IX 1944 9 hours. On DMP entered 26 hours after wound. Diagnosis after the entry: the blind-end fragmentation wound of left shin in upper third with damage of both of bones and front/leading tibial artery and vein.

Under chloroethyl stupefaction is produced the primary surgical processing: splitting up on the course of wound canal with the contra-aperture on the posterior surface of shin, the dressing of front/leading tibial artery and vein: is superimposed bandage with the hypertonic solution; immobilization by wire splint. Through the evacuation point it is directed in KhPPG, where entered 25/IX in the heavy condition with temperature of 38°, the pulse of 140 strikes/shocks per minute. Left foot, shin and knee joint are edematic, wound by size/dimension 4x12 and 6x15 cm, with sanious

discharge.

During 4 days the temperature within limits of 38-39°. Complaints of the overall weakness, the pains in the region of wound. 5/X 1944 it is evacuated to the following stage (SEG). The general condition of average/mean severity, from the wounds escape/ensues abundant suppurative separated, bone broken ends will stand, shin is edematic. The x-ray examination 5/X 1944 came to light/detected/exposed comminuted fracture of both bones of shin in the region of proximal metaphysis (X-ray photograph). 8/X is superimposed deaf gypsum bandage to upper third of thigh, is assigned inward streptocide. The general condition was improved, temperature fell to 37.5°.

Table 227. Distribution of casualties with the bullet break of the bones of shin according to the periods of the production of splitting up and carvings from the moment/torque of wounding (in the percentages to the result).

(1) Характер первичной хирурги- ческой обработки	(2) Сроки обра- ботки	(3) Первые сутки				(4)	(5)	(6)
		(7) от 1 до 6 часов	(8) от 7 до 12 часов	(9) от 13 до 24 часов	(10) час не указан	Итого	Позже суток	Всего
(11) Рассечение		13,9	16,1	19,7	12,3	62,0	38,0	100,0
(12) Нисечение		20,2	21,1	21,3	11,2	73,8	26,2	100,0

Key: (1). Character/nature of primary surgical processing. (2). Period of processing. (3). First day. (4). Altogether. (5). It is later than days. (6). In all. (7). from 1 to 6 hours. (8). hour is not indicated. (9). Splitting up. (10). Carving.

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Analysis of the blood from 24/X: Hb 51o/o, eras. 3430000, l. 8600, p. 8o/o, s. 66o/o, lymphs. 21o/o, mon. 5o/o, e. 0o/o; ROE 34 mm an hour.

9/X it is evacuated into the rear hospital. 27/X gypsum bandage is taken/removed; the wound with an abundant quantity of pus, crater-shaped.

28/X operation/process - large unit/formation of front/leading and posterior wound, removal/distance of granulation and necrotic tissues, and also of free bone fragments, processing the proximal broken end of the tibia, are introduced into the wound iodo-form tampons and is superimposed gypsum bandage to the middle of thigh. Are poured 250 ml of the conserved blood; next day gypsum bandage is taken/removed and superimposed cast. The general condition considerably was improved. 21/XI is again superimposed the deaf gypsum bandage which was taken/removed after 25 days: wounds with abundant suppurative discharge were carried out by large-grained granulation; is newly superimposed gypsum bandage with the subsequent cutting of window.

21/I 1945 gypsum bandage is taken/removed finally, is observed the cicatrization of wound.

16/II 1945 repeated X-ray photograph showed the significant displacement of extremital broken end; the proximal broken end of the tibia was wedged in between the frontally displaced broken ends of fibular bone. In the zone of break destructive changes (osteomyelitis). It is discharged 24/IV 1945 with the presence of fistula.

Estimating observation data, it should be noted that the wound was heavy, since it was located in immediate proximity of the knee joint and consisted in damage of both of bones and vessels. Primary surgical processing and subsequent surgical treatment, immobilization in the deaf gypsum bandage helped to maintain extremity.

Surgical processing with the removal/distance of bone fragments and processing of the fragments of bone was used in the presence in wound of the free bone fragments, not connected with the periosteum, which gave the possibility to sufficiently easily remove them; with respect to all means of primary surgical processing it composed only 16.60/o, including 0.40/o processing of the fragments of bone.

In the various forms of break the frequency of the use/application of an operation/process with the removal/distance of bone fragments was following: with the edge/boundary - 7.20/o, with the perforated - 8.30/o, with the oblique - 14.00/o, with that crushed - 14.70/o, with the cross and the longitudinal - 16.20/o and with the fragmented - 24.80/o.

A comparatively low percentage of the removal/distance of bone fragments with the compound fractures is explained care of fragments

as to the osteoplastic material. Furthermore, significant part (49.10/o) of casualties with the crushed break is produced amputation, and therefore they did not strike into a number of casualties, in who were removed bone fragments.

The periods of the removal/distance of bone fragments were different (Table 228).

Consequently, this means of processing in the significant percentage of the cases, (72.6) found use within the early periods after wound.

Table 228. Distribution of casualties with the bullet break of the bones of shin according to the periods of the removal/distance of bone fragments from the moment/torque of wound in the percentages.

(1) Периоды вытеснения				(2)	(3)	(4)
от 1 до 6 часов	от 7 до 12 часов	от 13 до 24 часов	не указан	Итого	Процент	Всего
22.2	18.3	10.6	11.5	62.6	27.4	100.0

Key: (1). First day. (2). Altogether. (3). Is later than first day. (4). In all. (5). from 1 to 6 hours. (6). hour is not indicated.

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For the characteristic of this means of surgical processing is given the following observation.

K. A. I., 36 years, is wounded 22/IX 1944. Diagnosis: through fragmentation wound of lower third of shin with the damage to the tibia.

4 Hours after wound entered DMP, where under ether anesthesia was produced primary surgical processing (splitting up, the carving of the crushed tissues and the removal/distance of the free bone

fragments), was superimposed bandage with Rivanol and extremity was immobilized by wire splint.

23/IX entered KhPPG in the satisfactory condition with the complaints on they were in the region of wound, with the subfebrile temperature, the pulse of 70 strikes/shocks per minute. On the removal/taking of bandage are discovered the split wounds with suppurative discharge on the front surface of shin 2.5x7 cm and on the external surface by the size/dimension 4x12 cm. Shin is edematous, there is no stress/voltage. Is produced the transfusion 250 ml of blood, is superimposed bandage with the hypertonic solution.

28/IX is superimposed deaf gypsum bandage. Course is smooth. In the following stage 18/X gypsum bandage was taken/removed. Are discovered wounds with the rose-colored granulation, significant suppurative discharge from the wounds; movements in the joints are maintained. In the X-ray photograph a comminuted fracture of the tibia without the displacement of splinters. 19/X is newly superimposed the deaf gypsum bandage to middle third of thigh, which was removed 30/XI. Is discovered the consolidation of break, wound with by moderate suppurative the separable and edge/boundary epithelization; in the region of wound on the front face is a fistula 2.5 cm.

11/XII operation/process under narcosis: splitting up of fistula course, removal/distance of bone sequestrations, processing by the chisel of the wall of sequestral area, into which is introduced the streptocide. Is superimposed gypsum "boot" to the knee joint. 19/XII in the "boot" is cut window.

Data of cytogram of wound from 27/XII: cocci of intra- and in large quantities, neutrophils extracellularly cover/coat entire field of view, polyblasts 10-12 in the field of view, macrophages rarely.

Analysis of the blood: Hb 70g/o, eras. 4310000, l. 9300, e. 40/o, p. 30/o, s. 620/o, lymphs. 260/o, mon. 50/o; ROE 10 mm an hour. Temperature is normal.

Further course smooth, wound slowly granulates and is epithelialized, 30/I 1945 repeated operation/process - curettage of fistula course. 2/III 1945 wound under the scab. 6/V on the external and front face of shin are determined two scars, several those soldered with the subject tissues. Movements in the talocrural joint satisfactory. 10/V 1945 it is discharged healthy/sound.

The given observation makes it possible to conclude that in this case both the volume the aid and the subsequent treatment were conducted correct that it contributed to full/total/complete

recovery.

Volume and character/nature of processing bone wound it was not always easily establish/install, taking into account the absence of preliminary roentgenological research at DMP and in KhPPG of the first line. Some surgeons (V. S. Levit) recommended the conducting of the radical processing of bone wound, removing bone fragments, up to the production of cross subperiosteal resection. Ya. M. Bruskin with bullet osteomyelitis recommended subperiosteal cross resection itself were obtained good results, especially with the bullet breaks of fibular bone; however, simultaneously he noted the delayed replacement by bone tissue of the defects, which were being formed after the resection of the tibia. Based on materials of the deepened development of the histories of disease/illness, the treatment of broken ends with the breaks of the bones of shin did not have extensive application in the period of the Great Patriotic War and comprised with respect to all elements of primary surgical treatment with the breaks of fibular bone 0.1c/o, with the breaks of tibial - 0.60/o and with breaks of both bones - also 0.60/o.

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The wide removal/distance of bone fragments during the primary and secondary surgical processing (see below) did not prevent the

development of osteomyelitis, but considerably retarded the coalescence of bone and led to an increase in the quantity of not-grown-together breaks and pseudarthroses.

Surgeons' majority in the period of the Great Patriotic War conducted the sparing processing of bone wound, leaving in the wound the bone fragments, connected with the periosteum, and thereby large/coarse fragments.

Surgical processing during the damages of vessels. Together with the surgical processing of soft tissues and bones, deserves attention a question about the relation to the damaged vessels of shin. According to the data of the deepened development, the damage of vessels with the bullet breaks of the bones of shin was observed into 14.90/o of cases. It turned out that during the primary surgical processing far not in all cases of damaging the vessels was conducted the final stop of hemorrhage.

With the bullet breaks of the bones of shin, which were being escorted/tracked by the damage of large/coarse blood vessels, were produced the following operations/processes: the dressing of vessels - into 17.20/o, amputation - into 48.50/o, primary processing without the dressing of vessels - into 27.40/o, primary processing was not produced into 5.90/o of cases, the character/nature of processing was

not indicated into 0.90/o.

Consequently in 34.30/o wound of vessel in the army area it was not identified, including into 27.40/o primary surgical processing with the damaged vessels was not matched with their dressing. The majority of these cases related to such wounds which did not give the symptoms of explicit hemorrhage at the moment of processing. The wound of vessel in these cases was distinguished on the basis of the onset of late external hemorrhages or increase of intermuscular hematomas.

The degree of surgical activity with different caliber of the damaged vessels is shown in Table 229.

From the represented materials it follows that most frequently during the primary treatment was distinguished the damage to front/leading and posterior tibial artery; therefore them and they bandaged more frequently than other arteries.

Medicinal/medicamentous action on the wounds after primary surgical processing.

Table 229. Distribution of casualties with the break of the bones of shin and multiple failure of large vessels according to the character/nature of primary surgical processing (in the percentages).

(1) Операция	(2) Артерия	(3) Бедрен- ная и подколен- ная	(4) Задняя больше- берцовая	(5) Передняя больше- берцовая	(6) Прочие
(7) Перевязка сосуда во время первич- ной хирургической обработки . .		42,9	66,1	65,7	36,4
(8) Прочие виды первичной хирургиче- ской обработки		52,4	26,9	32,3	63,6
(9) Не было произведено первичной хи- рургической обработки		4,7	7,0	2,0	—
(10) Итого...		100,0	100,0	100,0	100,0

Note. Casualties with the produced amputation in this table are not represented.

Key: (1). Operation/process. (2). Artery. (3). Femoral and popliteal. (4). Posterior tibial. (5). Front/leading tibial. (6). Other. (7). Dressing of vessel during primary surgical processing. (8). Other means of primary surgical processing. (9). It was not produced primary surgical processing. (10). Altogether.

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In the beginning of war extensively used, especially with the contaminated, suspicious in the relation to anaerobic infection wounds, 1 and 20/o solutions of chloramine, 0.250/o potassium

permanganate, 20/o peroxide of hydrogen, 5 and 100/o the hypertonic solutions of common salt. Fluid/liquid of Carrel- Daquin, solution of ammonium salts of silver, Rivanol, etc. were used comparatively rarely. On some DMP and in the number of field therapeutic installations they widely put to use A. V. Vinyovskiy's ointment, somewhat more rarely were used balsam substances (the balsam of fir of A. S. Chechulin), different phages and so forth, etc.

However, soon preference was returned to sulfanilamide preparations, primarily to streptocide which almost completely displaced all remaining substances, which were being used during the primary surgical processing.

Relative to tamponade of wound after primary surgical processing were different opinions. Surgeons' majority in the presence of extensive wounds after processing loosely tamped them. Sometimes was used tight tamponade for the purpose of hemostasis, which led to the poor consequences (survey of the damage of large vessels, the development of anaerobic infection).

Immobilization. The transport immobilization (in the overwhelming majority of the cases) and the therapeutic immobilization (it is rare) were the necessary completing element of primary surgical processing, especially under conditions DMP and

KhPPG of the first line. From its quality to a considerable degree depended further course of the break of the bones of shin.

From the study of the materials of the deepened development of the histories of disease/illness it follows that the immobilization after primary surgical treatment in essence was realized by a wire splint in different combinations. By one posterior modeled in form of shin splint, to which were added the lateral splints, which envelope foot in the form of stirrup and raised above elbows, was achieved the completely sufficient transport immobilization of the bullet breaks of the bones of shin, in any case within the limits of army area.

Given below data characterize the frequency of the use/application of different forms/species of immobilization after the primary surgical processing (Table 230).

Table 230. Distribution of casualties with the bullet break of the bones of shin according to the localization of break and the form/species of immobilization after the primary surgical processing (in the percentages).

(1) Наименование кости	(2) Вид иммобилизации					(3) Всего
	(4) шина				(7) глухая гипсовая повязка	
	Дл.(5) терихса- Томаса и и Вино- градова	(6) проволоч- ная	(7) гипсовая	(8) все дру- гие типы шин		
(10)						
(11) Малоберцовая	0,9	59,7	4,4	33,5	1,5	100,0
(12) Большеберцовая	2,9	55,9	6,0	32,9	2,3	100,0
(13) Обе кости	5,2	53,8	4,6	34,8	1,6	100,0
(13) В среднем...	3,4	55,6	5,3	33,8	1,9	100,0

Key: (1). Designation of bone. (2). Form/species of immobilization. (3). In all. (4). Splint. (5). Diedrichs-Thomas and and vino-gradova. (6). wire. (7). gypsum. (8). all other types of splints. (9). deaf gypsum bandage. (10). In all. (11). Fibula. (12). Tibia. (13). Both bones. (13). On the average.

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As can be seen from given data, more than in half of all cases immobilization was realized by a wire splint. The splints of Diedrichs and Thomas-Vinogradov had very limited application with the isolated/insulated breaks of one bone and somewhat more frequent (into 5.20/o were used with breaks of both bones of shin. Gypsum immobilization after primary surgical processing did not have extensive application in the army and army area. Under conditions of DMP and KhPPG of the first line abstained from the application of deaf gypsum dressing in view of the complex technology the immobilizations, which requires the abandonment of wounded on the spot to the drying out of bandage, and on the other hand, as a result of the difficulties of supervision of the manifestation of anaerobic infection. Gypsum longitudinal bandages laid more willingly. In KhPPG of the second line and in the army evacuation hospitals deaf gypsum bandage had already greater use/application.

Characteristic of the bullet breaks of the bones of shin, which were not undergoing primary surgical processing.

Of all casualties with the bullet break of the bones of shin in 24.40/o primary surgical processing was not performed on the different reasons:

1) as a result of the severity of wound (sometimes with the lethal outcome during the first and partially second day from the moment/torque of wound) and taking into account the late delivery/procurement of casualty at DMP or in KhhPPG - not more than 1.00/o;

2) as a result of organizational difficulties (overload of stage urgent redislocation, the defects of diagnosis) - from 10.0 to 11.00/o;

3) in view of the absence of readings/indications - 88.00/o.

S. I. Banaytis, P. A. Cyprian, N. N. Yelanskiy and N. N. Petrov considered it appropriate to deviate from the primary surgical processing in the cases of perforating wounds in the presence of a small entrance and outlet, without the significant crushing of the skin edges of wound and in the absence of extensive damages in the depth, and also the compressions of large vessels and nerves.

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Clinically with the visual inspection this is expressed by the absence of stress/voltage, increase in the volume and significant sickliness.

Table 231. Operability in the army area of the casualties, who were not subjected to the primary surgical processing (in the percentages).

(1) Наименование кости	(2) Вид перелома		
	(3) дырчатый, поперечный, продольный, косой, краевой	(4) раздробленный	(5) крупно- и мелко-оскольчатый
(6) Малоберцовая . . .	7,8	28,0	9,1
(7) Большеберцовая . .	5,5	26,8	1,4
(8) Обе кости	10,4	30,9	16,6
(9) В среднем . . .	6,4	29,1	12,3

Key: (1). Designation of bone. (2). Form/species of break. (3). perforated, cross, longitudinal, by sand bar, edge/boundary. (4). crushed. (5). large/coarse and chalk fragmented. (6). Fibula. (7). Tibial. (8). Both bones. (9). On the average.

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Simple breaks did not undergo primary surgical processing into 31.0o/o, complex - into 20.2o/o. During the damages to one fibular bone were not treated by 28.4o/c, one tibial - 27.8o/o and both bones - only 16.4o/o.

On that, how correct was decision/solution not subject casualties to primary surgical processing, testify the frequency of

the operations/processes, produced by this casualty subsequently, the frequency of both good outcomes and complications.

In the army area the operations/processes by the casualty of this group were produced into 11.7c/o. The frequency of these operations/processes was different, depending on the form/species of break (Table 231).

Most frequently performed operations/processes with the crushed breaks and with multiple failure of both bones shins.

The produced in the army area operations/processes were distributed according to the character/nature as follows (Table 232).

As can be seen from Table 232, with the large/coarse and small-splintered breaks the percentage of operations/processes apropos of suppurative complications is above (6.80/o), than with other forms/species of breaks.

Sharply was increased the percentage of amputations (to 17.3) with the crushed breaks, comprising with all other forms/species of break from 0.2 to 0.9. Consequently, abstention from the primary surgical processing with the crushed breaks of bones was not always appropriate.

It should be noted that the percentage of the crushed breaks among the casualties, by which was not performed the primary surgical processing, was small and did not exceed 11.8, whereas among those processed it composed 26.1.

Failure of the primary surgical processing in the overwhelming majority of the cases was justified by the character/nature of the break, about which testify 93.6c/c of casualties about by the simple break, not undergoing operations/processes in the army area.

The given below observation is the example, when primary surgical processing was not shown.

Table 232. Distribution of the casualties, who were not subjected to primary surgical processing, according to the type of the operations/processes, produced by it in the army area, in the dependence on the form/species of break (in the percentages).

(1) Вид перелома	(2) Не было произведе- но опе- раций	(3) Опери- ровано	(4) (5) ампута- ция	О п е р а ц и и			(9) Прочие
				(6) вскрытие гнойных заключен флегмон	(7) удаление инород- ных тел и костных осколков	(8) ревиция раны и контра- апертуры	
(10) Простой, дырчатый, краевой, попереч- ный, продольный, косой	93,6	6,4	0,2	2,9	1,4	0,7	1,2
(11) Крупно- и мелко- оскольчатый	87,7	12,3	0,9	6,8	2,7	1,2	0,7
(12) Раздробленный . . .	70,9	29,1	17,3	4,6	2,6	4,0	0,6

Key: (1). Form/species of break. (2). It was not produced operations/processes. (3). It is operated. (4). Operation. (5). amputation. (6). autopsy of suppurative flows and phlegmons. (7). removal/distance of foreign bodies and bone fragments. (8). examination and contra-aperture. (9). Other. (10). Simple, perforated, edge/boundary, cross, longitudinal, by sand bar. (11). Large/coarse and small-splintered. (12). Crushed.

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L. M. N., 20 years, is wounded 13/II 1944 11 hours; in the company sector was made the dressing. Entered PMP with the diagnosis: the perforating bullet wound of middle third of right shin with the

break of the tibia. At PMF to casualty is superimposed wire splint, is introduced morphine even 1 500 units of antitetanus serum. At DMP it entered through the knocks after wound. Active surgical processing was not performed. Passed the series/number of stages. It entered into the evacuation hospital 4/III 1944 with the immobilization of shin by wire splint. The general condition satisfactory, no complaints, temperature normal.

Analysis of the blood: Hb 86o/o, eras. 4 700 000, l. 9 100, s. 60.5o/o, p. 4.5o/o, lymphs, 24o/o, mon. 7o/o, e. 4o/o; ROE 27 mm an hour.

Shin is slightly edematic: on the front face point inlet, on posterior-medial surface exit is somewhat greater size/dimension circular wound aperture under the crust. Suppurative liberations/excretions, the infiltrations of tissues is not noted.

X-ray examination from 4/III 1944 came to light/detected/exposed the multifragment break of middle third of the tibia in the form of "butterfly"; bone fragments were arranged/located compactly, with exception several fine/small of those torn away toward the rear into the soft tissues. 7/III was superimposed deaf gypsum bandage to inguinal region. Course smooth, there are no complaints, temperature normal. Gypsum bandage is taken/removed 10/IV, is probed the callus,

wounds healed.

9/V the repeated x-ray examination 3 months after wound. Almost full/total/complete consolidation of basic broken ends with the small fragments in the center of the callus. Repeated analysis of the blood from 22/V 1944: Hb 80o/o, eras. 4 160 000, l. 9 700, s. 52.5o/o, p. 4.5o/o, lymphs. 31o/o, mon. 5o/o, e. 7o/o.

Internal organs/controls in the limits of norm. The general condition is good.

30/V 1944 it is discharged by that recovered (3 1/2 months after wound).

Observation data shows that in connection with the absence of the extensive decomposition of the soft tissues of readings/indications to the primary surgical processing it was not.

The preliminary observation during 3 weeks, which excluded suppurative complications, made it possible to put on 2 months the deaf gypsum bandage, under which advanced the full/total/complete consolidation of break.

Percentage relationships/ratios of repeated surgical

interventions, produced by casualty, who were not undergoing primary surgical processing, are represented in the following form (table 233).

Given data attest to the fact that deviation from the primary surgical processing it was most substantiated in a significant quantity of cases with the "simple" breaks and first of all with the bullet breaks of fibular bone (69.6c/o).

Table 233. Distribution of casualties with the bullet break of the bones of shin, which were not undergoing primary surgical processing, according to a number of operations/processes, produced in all stages, and according to the form/species of break (in the percentages).

(1) Количество операций	(2) Поврежденная кость в вид перелома					
	(3) большеберцовая		(4) малоберцовая		(5) обе кости	
	(6) простой	(7) сложный	(8) простой	(9) сложный	(10) простой	(11) сложный
(8) Одна	27.4	36.4	22.6	36.5	33.4	33.2
(9) Две	12.1	16.8	4.3	9.9	14.6	21.7
(10) Три	2.4	5.5	2.6	4.5	—	7.4
(11) Четыре	1.0	1.5	—	1.3	—	0.5
(12) Пять-шесть	—	—	0.9	—	—	0.9
(13) Операций не производилось	57.1	39.8	69.6	57.8	50.0	36.3
(14) Всего	100.0	100.0	100.0	100.0	100.0	100.0

Key: (1). Quantity of operations/processes. (2). Damaged bone and ~~the~~ ^{type} of break. (3). tibial. (4). fibular. (5). both bones. (6). simple. (7). complex. (8). One. (9). Two. (10). Three. (11). Four. (12). Five-six. (13). Operations/processes it was not produced. (14). In all.

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Just as in casualties, who were undergoing primary surgical processing, with the compound fractures more frequently it was

necessary to produce reiterative surgical interventions.

Treatment in an army area in connection with the primary surgical processing.

Duration of treatment and a quantity of stages, passed by casualties. An essential role in the consolidation of the results, achieved by primary surgical processing, played the subsequent stage treatment with the evacuation according to the designation/purpose, moreover 75.80/o of casualties with the break of the bones of shin passed from three to seven stages, 20.20/o - more than seven stages and only 4.00/o - one-two stages (into this number entered all stages from DMP to the rear evacuation hospitals).

It should be noted that the casualties, who passed one-two stages, related to a number of most heavily casualties and many of them perished in these stages from the early complications.

Toward the end of the war the multistratal nature somewhat decreased; so, during one offensive operation on N front in 1945, beginning with PMP to the installations of front inclusively, 85.20/o of casualties passed to three-six stages, 9.50/o of casualties passed seven and more than stages and 5.30/o - not more than two stages.

Are of certain interest the comparative data about the stage treatment of casualties with different form/species of the break of the bones of shin, eliminating dead persons, during entire period of war.

As can be seen from Table 234 in a number of passed stages it is possible to establish/install more or less significant difference only between the perforated and edge/boundary breaks, on one hand, and by those crushed - with another; thus, for instance, nine and more than stages casualties with the edge/boundary and perforated break passed more than twice less frequent than casualties with comminuted fracture, and seven and eight stages - are 1.3 times less frequent.

The duration of the treatment of casualties with the bullet break of the bones of shin in the army and army area, according to the data of the author's development of the histories of the disease/illness of the period of one offensive operation of N front of 1945, was different (Table 235).

Table 234. Distribution of casualties with the different bullet breaks of the bones of shin according to a number, the passed stages (in the percentages).

(1) Вид перелома	(2) Количество пройденных этапов					(3) Всего
	1-2	3-4	5-6	7-8	9-10	
(4) Дырчатый и краевой . . .	2,4	32,1	46,5	17,1	1,9	100,0
(5) Поперечный, продольный и косой	1,8	26,2	53,0	16,1	3,1	100,0
(6) Крупно- и мелкооскольчатый	1,7	26,1	51,0	17,7	3,5	100,0
(7) Раздробленный	1,5	21,2	50,6	22,5	4,2	100,0

Key: (1). Form/species of break. (2). Quantity of passed stages. (3). In all. (4). Perforated and edge/boundary. (5). transverse (longitudinal and impacted). (6). Large/coarse and small-splintered. (7). Crushed.

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Thus, for instance, from 1 to 3 days casualties conducted in the army area more than three times more frequently than in the army; the same difference is noted also in the periods of treatment from 7 to 15 days; very rarely casualties were treated in the army area from 16 to 30 days, but more 30 days were not treated at all. These special features/peculiarities are completely explained by those possibilities of the treatments which were in these areas, and by those problems which stood before the therapeutic installations of

army and army area in this offensive operation.

Characteristic of complications. In the army therapeutic installations the complications were noted into 11.00/o, in the army ones - into 26.30/o and in the front line ones - into 24.30/o to a total number of treated casualties in each area individually (table 236). In more detail complication with the bullet breaks they are dismantled/selected at 16 volume. Here are given the general information about the complications with the bullet breaks.

From given data it follows that in the army area to prophylaxis and to the treatment of shock was paid the serious attention and therefore the percentage of complications shock in the army area was much less.

Table 235. Distribution of casualties with the bullet break of the bones of shin according to the periods of treatment in the army and army area (in the percentages). According to the data of the offensive operation of N front in 1945.

(1) Срок лечения в днях	(2) Район госпитализации	
	(3) воинской	(4) армейский
1-3	71,9	22,4
4-6	18,4	13,2
7-15	8,8	26,9
16-30	0,9	23,5
(5) Более 30	—	14,0
(6) Итого	100,0	100,0

Key: (1). Period of treatment in days. (2). Area of hospitalizations.
(3). army. (4). army. (5). It is more. (6). Altogether.

Table 236. Frequency of early complications in the wounded the shin with the damage bones (in the percentages).

(1) Район	(2) В и д о с л о ж н е н и я							
	(3) шок	(4) анаэроб- ная ин- фекция	(5) сепсис	(6) гнойный артрит	(7) острый остеоми- елит	(8) обильное гное- ние в ране	(9) гнойный затек	(10) прочие
(11) Войсковой	4.7	2.9	0.1	—	—	0.3	0.2	2.8
(12) Армейский	0.6	6.4	0.9	0.8	—	11.9	2.1	3.6
(13) Фронтвой	0.01	0.7	0.9	0.8	2.8	7.2	3.8	8.1

Key: (1). Area. (2). Form/species of complication. (3). shock. (4). anaerobic infection. (5). sepsis. (6). suppurative arthritis. (7). acute osteomyelitis. (8). abundant festering in wound. (9). suppurative flow. (10). other. (11). Army. (12). Army. (13). Front line.

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The majority of the early complications of infections (anaerobic infection, sepsis, suppurative arthritis and the abundant festering of wound) fell to the army area; other complications which were distinguished only after a lapse of certain time (acute osteomyelitis, suppurative flows), most frequently they were encountered in the front line area.

According to the data of the author's development of the

histories of disease/illness, the frequency of suppurative wound complications, depending on the stage of primary entry and development stage, was following: during the entry and the primary surgical processing at DMP - 14.8c/o after the entry at DMP and the processing in KhPPG - 14.7o/o after the entry at DMP and the processing in the army evacuation hospital - 19.0o/o, after the entry and during the processing in KhPPG - 10.8o/o in not subjected to primary surgical processing - 11.7o/o.

If we consider that in the army evacuation hospital was processed very little (it is less than 1.8o/o) casualties, having passed through DMP and not processed on it, then it is necessary to recognize that the lowest percentage of suppurative complications (10.8o/o) was noted in those processed in KhPPG which entered there predominantly from the units, passing DMP.

It is completely obvious that most heavily casualties they passed to nearest DMP, whereas obtained lighter ones without the harm for their health were evacuated into the rear of army.

Analyzing character/nature and frequency of complications in casualties, it should be noted that the onset of complications in them was, first of all, connected with the severity of damage, the significant sizes/dimensions of the decomposition of bones and soft

tissues, with the damage of joints and nerves, the blood loss and weakening of the resistivity of the organism of casualties. During the heavier damages of the bones of shin were produced more complex operations/processes. After primary surgical processing with these wounded frequently were required repeated operations/processes. After such complex operations/processes frequently were developed severe complications and were observed the worse results, than after simple operations/processes. However, these complications and worse results were explained, mainly, with the severity of wound and in any way cannot be joined them with the greater complexity and the frequency of the applied operations/processes. Therefore given data relative to some early and late complications in wounded the shin with the break bones in connection with the means of primary surgical processing must be estimated as relative.

Anaerobic infection was encountered during any processing of wound; however, most rarely during the removal/distance of foreign bodies and most frequently with the dressing of vessels.

Bullet osteomyelitis was encountered frequently after all means of primary surgical processing. However, during the removal/distance of bone fragments its percentage sharply increased/grew and it achieved 59.9.

Operational activity of the army area, besides the primary surgical processing, consisted of additional to it interventions, in the examination of wound and the repeated processing in the presence of the corresponding readings/indications.

Furthermore, the very important section of work in the army therapeutic installations was struggle with the early complications and first of all with the anaerobic and pyogenic infections (table 237).

One should consider that represented in table 237 surgical interventions in the army area composed only 19.10/o and remaining - 80.90/o of all wounded, that were subjected to primary surgical processing, the repeated operation/process they did not require. In the front line area it was respectively operated by 18.20/o of casualties, but 81.80/o of casualties they were not operated.

Attention is drawn to low specific gravity/weight (2.80/o) of such important therapeutic measures as the examination of wound.

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Are of also interest the data about a quantity of produced repeated operations/processes after the primary surgical processing

by casualty during entire period of treatment up to the determined outcome (Table 238).

As can be seen from data of Table 238, casualties with the simple break of the bones of shin it was necessary to repeatedly operate considerably less frequent than casualties with the compound fracture, especially with the damage to the tibia and both bones of shin.

Should be focused attention on the fact that with breaks of both bones of shin a number of single operations/processes was more with the compound fractures, than with the simple ones; whereas a number of repeated operations/processes was more with the simple breaks. This is explained by the fact that with compound fractures of both bones the shins were more frequent of amputation, after which repeated operations/processes were produced rarely.

Table 237. Character/nature and the frequency of the produced after primary surgical processing operations/processes in the army and front line area (in the percentages).

(1) Район	(2) О п е р а ц и и						(9) Итого
	(3) ревизия раны	(4) удаление костных осколков и инородных тел	(5) перевяз- ка сосу- дов	(6) вскрытие гнойни- ков	(7) ампу- тация	(8) прочие	
(10) Армейский	2,8	2,5	1,1	3,4	7,6	1,7	19,1
(11) Фронтвой	0,7	2,7	0,3	3,2	3,2	8,1	18,2

Key: (1). Area. (2). Operations/processes. (3). examination of wound. (4). removal/distance of bone fragments and foreign bodies. (5). dressing of vessels. (6). autopsy of abscesses. (7). amputation. (8). other. (9). Result. (10). Army. (11). Front line.

Table 238. Distribution of wounded with the bullet break of the bones of shin according to a number of produced operations/processes, besides the primary processing (in the percentages).

(1) Наименование кости и вид перелома (2) Количество операций	(3) Большеберцовая		(4) Малоберцовая		(5) Обе кости	
	(6) простые	(7) сложные	(8) простые	(9) сложные	(10) простые	(11) сложные
1	65,6	59,0	71,9	63,0	53,4	60,0
2	24,7	27,9	19,7	23,6	34,2	26,8
3	6,3	9,8	5,1	9,0	8,5	9,5
4	2,9	2,2	2,6	3,4	2,2	2,8
5-6	0,5	0,9	0,7	1,0	1,7	0,8
7-8	—	0,3	—	—	—	0,1
(8) Итого . . .	100,0	100,0	100,0	100,0	100,0	100,0
(9) Всего подвергалось операциям	52,2	72,3	42,7	52,1	59,9	72,5

Key: (1). Designation of bone and the form/species of break. (2). Quantity of operations/processes. (3). Tibial. (4). Fibular. (5). Both bones. (6). simple. (7). complex. (8). Altogether. (9). In all it underwent operations/processes.

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On the average a number of repeated operations/processes with the breaks of different bones little was distinguished; so, with the breaks of one fibular bone it was equal to 1.4, one tibial - 1.5, also, with breaks of both bones of shin - 1.6.

Small average number of repeated operations/processes fell to edge/boundary breaks (1.35-1.37) then follow perforated (1.4-1.5); somewhat more than operations/processes (1.5-1.7) fell to the compound fractures. With cross breaks of both bones of shin on the average to one casualty it was necessary two operations/processes. Consequently, severity damages to bone and form/species of the break to the known degree determined the frequency of repeated surgical interventions.

There is significant interest in the study of the problem about the value of different means of primary surgical processing for preventing complications in casualties in the army area and about the need for subjecting these casualties of repeated operation/process.

After primary surgical processing only in the limits of soft tissues as most frequent occasion for the repeated operations/processes (more than third cases) in the army and in the army area served anaerobic infection, moreover with the different types of processing the frequency of this occasion was almost identical: so, after "splitting up" anaerobic infection was the reason for the repeated operations/processes into 38.20/o, after carving - into 39.00/o and after the removal/distance of foreign

bodies - into 39.10/o.

The characteristic of the repeated operations/processes in the army area, produced they are wounded, of subjected to primary surgical processing in the limits only of soft tissues, on the individual elements this processing it is possible to see from Table 239.

Consequently, most frequently repeated operations/processes, in particular amputation and autopsy of flows, were produced after the carving of wound. As noted above, carving was undertaken in the presence of the heavier, crush wounds.

Table 239. Distribution of the repeated operations/processes, produced in the army area after the primary surgical processing of soft tissues with the bullet breaks of the bones of shin (in the percentages).

(1) Вид первичной хирургической обработки	(2) Повторные операции		(3) Вид повторной операции					
	(4) не про- изводились	(5) произ- водились	(6) ампу- тация	(7) вскры- тые гнойных загноев	(8) герметиза- ция раны	(9) удаление костных осколков и инород- ных тел	(10) переопла- тка сосу- да	(11) прочие
(12) Рассечение	81.4	18.6	6.8	4.0	3.7	2.5	0.7	0.9
(13) Рассечение и посе- чение	78.1	21.9	9.5	4.5	3.2	2.2	1.6	0.9
(14) Рассечение с уда- лением инородных тел	82.9	17.1	5.6	3.3	3.3	2.2	1.6	1.1
(15) В среднем . . .	80.5	19.5	7.3	4.2	3.6	2.5	0.9	1.0

Key: (1). Means of primary surgical processing. (2). Repeated operations/processes. (3). Means of repeated operation/process. (4). they were not produced. (5). they were produced. (6). amputation. (7). autopsy of suppurative flows. (8). examination of wound. (9). removal/distance of bone fragments and foreign bodies. (10). dressing of vessel. (11). it is strong/durable. (12). Splitting up. (13). Splitting up and carving. (14). Splitting up with removal/distance of foreign bodies. (15) On the average.

Special examination deserve the cases of the combination of

bullet break with the simultaneous wound of large vessel. It is very important it was important to recognize the wound of large vessel and to bandage it during the primary surgical processing (Table 240).

If the dressing of vessel during the primary processing was not produced, then, according to data of Table 240, a number of operations/processes in the army area was more one and a half times.

During the comparison of the clinical course in those casualties, by which during the primary surgical processing via the dressing of vessel they stopped hemorrhage, with clinical coursing in the casualties, in who it was not produced the simultaneous dressing of vessel, turned out to be the following: the cases of amputations both in the first (7.50/o) and in second group (8.30/o) with the simple breaks they were sufficiently rare; however if with the compound breaks it was not produced the simultaneous dressing of the damaged vessel, then the frequency of amputations was increased and achieved 62.20/o and lethality was increased doubly.

The frequency of complications anaerobic infection, depending on the periods of processing was: during the processing in the first 6 hours - 7.70/o in the second 6 hours - 8.00/o from 13 to 24 hours - 11.20/o later than days - 13.00/o, i.e., during the processing after 6 hours the percentage of the complications of gas infection

consistently was increased, especially if processing was conducted from the second day after wound.

Clinical coursing in casualties, by which during the primary surgical processing were removed the bone fragments, had some special features/peculiarities in comparison with the group of casualties by which the processing was performed only in the limits of soft tissues.

Table 241 gives the information about surgical interventions in army area after the removal/distance of bone fragments.

Table 240. Repeated operations/processes in the army area after processing of casualties with the bullet wound of bones and vessels of shin (in the percentages).

(1) Первичная хирургическая обработка	(2) Повторные операции		(3) Характер повторной операции				
	(4) не про- изво- дились	(5) произво- дились	(6) ампута- ция	(7) вскрытие гнойных вatenов	(8) ревизи- я раны	(9) удаление костных осколков и инород- ных тел	(10) перевязка сосудов
(11) С перевязкой сосу- да	67,1	32,9	25,1	3,1	2,6	1,6	0,5
(12) Без перевязки со- суда	40,3	59,7	34,9	3,0	3,6	1,7	16,5

Key: (1). Primary surgical processing. (2). Repeated operations/processes. (3). Character/nature of repeated operation/process. (4). they were not produced. (5). they were produced. (6). amputation. (7). autopsy of suppurative flows. (8). examination of wound. (9). removal/distance of bone fragments and foreign bodies. (10). dressing of vessels. (11). With dressing of vessel. (12). Without of dressing of vessel.

Table 241. Repeated operational intervention, which were required in the army area after the removal/distance of bone fragments during the surgical processing of the bullet breaks of the bones of shin (in the percentages).

(1) Повторные операции		(2) Вид повторной операции					
(3) не произ- водились	(4) произво- дились	(5) ампута- ция	(6) вскрытие гнояных затек	(7) ревизия раны	(8) удаление кост- ных осколков и инородных тел	(9) перевязка сосуда	(10) прочие
78.9	21.1	10.4	2.7	2.1	3.8	1.2	0.9

Key: (1). Repeated operations/processes. (2). Means of repeated operation/process. (3). they were not produced. (4). they were produced. (5). amputation. (6). autopsy of suppurative flows. (7). examination of wound. (8). removal/distance of bone fragments and foreign bodies. (9). dressing of vessel. (10). other.

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During the comparison of these data with the appropriate data about the repeated operations/processes after the primary surgical processing only of soft tissues (Table 238 and 241), turns not itself the attention an increase in the percentage of all operations/processes from 19.5 to 21.1 and increase of the number of operations/processes of the additional removal/distance of bone fragments and amputations.

The complications, which required additional surgical interventions, were sufficiently serious, since almost half of all operations/processes fell during the amputation.

According to the data of the author's development of the histories of disease/illness, after the removal/distance of bone fragments anaerobic infection served as occasion for the repeated operations/processes generally into 32.0o/o and, in particular, by occasion for the amputations into 34.0o/o, i.e., in the smaller percentage than after treatment only of soft tissues.

Wounds, with which during primary surgical treatment was produced the removal/distance of bone fragments, were complicated by the anaerobic infection into 10.8o/o, moreover among them into 6.0o/o anaerobic infection was diagnosed in the subsequent stages of the medical evacuation. In remaining 4.8o/o was noted the development of anaerobic infection in the same therapeutic installation where was for the first time operated casualty. It is possible that in some of these latter/last cases the primary surgical processing was performed, when gaseous infection clinically yet did not have time to come to light and, generally speaking, this was not primary processing, but first operation/process apropos of complication.

In connection with volume and character/nature of primary surgical processing is of interest a question about the not-grown-together breaks with the determined outcomes as a result of treatment. This complication did not exceed 2.50/o with respect to all casualties.

During the analysis it turned out that the dummy joints after the extensive removals/distances of the bone fragments were observed doubly more frequently than during processing only of soft tissues, which is especially noticeable with the crushed breaks (Table 242).

Table 242. Frequency of the not-grown-together breaks after the bullet wounds of shin in connection with the form/species of break and the character/nature of its processing (in the percentages).

(1) Характер обработки	(3) поперечный, продольный, косой	(4) крупно- и мелкоосколь- чатый	(5) раздроб- ленный
(6) Рассечение и иссечение с удалением костных ос- колков	3,7	4,0	20,0
(7) Рассечение и иссечение без удаления костных осколков	0,4	2,0	10,0
(8) Обработки не было	0,5	1,1	10,3

Key: (1). Character/nature of processing. (2). Form/species of break. (3). cross, longitudinal, by sand bar. (4). large/coarse and small-splintered. (5). crushed. (6). Splitting up and carving with removal/distance of bone fragments. (7). Splitting up and carving without removal/distance of bone fragments. (8). Processings it was not.

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The character/nature of primary surgical processing among other reasons in the pathogenesis of the not-grown-together breaks, it is doubtless, has high value. With the excessive radicality of the removal/distance of large/coarse fragments is increased diastasis

between the broken ends and organism thereby are deprived of plastic material, and, on the other hand, insufficient and belated primary surgical treatment, especially bone wounds, the poor reposition of broken ends could be reasons the developments of osteomyelitis, and therefore the abandonment of fragments was not only useless, but also risky.

Repeated wide being all-inclusive surgical interventions after the preceded roentgenological inspection/examination and with the subsequent therapeutic immobilization composed to 13.00/o of all operations/processes during the first 10 days after wound. On the periods they were produced: to 12 hours into 5.90/o, from 13 to 24 hours into the 6.60/o to the 2nd day into 14.10/o, to the 3-5th day into 48.20/o, to the 6-10th day into 25.20/o.

Consequently, almost into 3/4 all cases repeated operations/processes were performed within the sufficiently late periods, i.e., from 3 to 10 days after wound, that far it is not by chance, since favorable conditions for the rendering to the full/total/complete specialized aid occurred, beginning from the army hospitals.

As reading/indication to the repeated surgical processing with the rendering specialized aid by that wounded into the shin served

faulty primary processing. Frequently this was explained by the impossibility to determine in the fresh wound the real degree of the damage of tissues, by difficulty to be oriented without the x-ray examination, by the impossibility to remove foreign bodies and fragments of bone as a result of the hemorrhage and by the frequently forced haste of primary surgical processing under conditions of DMP. The volume of operations during rendering to the specialized aid was determined in essence by the degree of the developing inflammatory phenomena in the wound (P. A. Cyprian, V. V. Gorinevskaya), but was always assumed the full/total/complete examination of wound. With the significant inflammatory phenomena it was necessary to be limited to the disclosure/expansion of hematoma, to the removal/distance of the necrotized tissues and to the provision of the proper drain from the wound.

In connection with the special features/peculiarities of the dissemination of hematomas and suppurative flows on the fascial beds of shin repeated processing predominantly in the region of posterior fascial bed presented significant difficulties, especially for the inexperienced surgeons.

Therapeutic immobilization by deaf or fenestrated gypsum bandage rarely was used at DMP, which was the basic stage of primary surgical processing for the overwhelming majority of casualties, and on the

average composed 6.90/o. Then therapeutic immobilization in KhPPG of the second line and army evacuation hospitals was widely applied.

From given in ¹table 243 data it is evident that the percentage of application of medical immobilization in the army area during the first three years gradually was increased, and on the fourth year sharply it increased.

The periods of the imposition of therapeutic immobilization with coursing of war were shortened.

Given in ¹table 244 data characterize surgeons' tendency as fast as possible to put therapeutic immobilization with the bullet breaks of shin.

Besides the operation/process and the therapeutic immobilization, local action on the wound process was realized with the aid of the chemical and physical substances, which was matched to a certain extent with the over-all strengthening measures.

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Blood transfusion. In prophylaxis of complications and in the process of the treatment of the bullet breaks of the bones of shin

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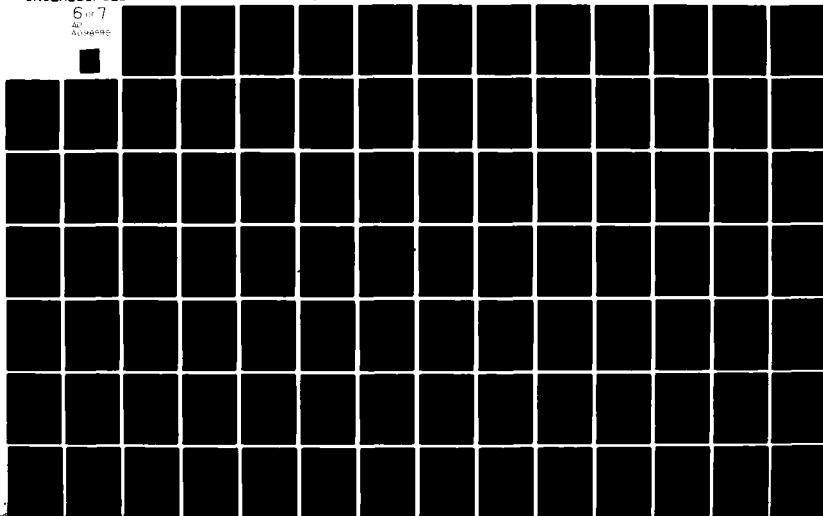
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vast role belonged to such therapeutic measures as the transfusion of blood and blood-substituting fluids/liquids; the blood transfusion is produced by 29.70/o of casualties with the bullet break of the bones of shin. The blood was transfused in the following stages of evacuation: army area - 15.60/o army - 22.00/o of front line - 14.10/o, rear - 22.20/o and in different regions - 26.10/o.

From given data it follows that more than all third transfusions of blood and blood-substituting fluids/liquids were produced in the army and army area. This percentage was actually large, if one considers that the significant part of the blood transfusions, made "in the different areas" related to the army and army area.

Readings/indications to the transfusion of blood and blood-substituting fluids/liquids in the army, army and front line area, according to data of author's development, were different.

Given in Table 245 data attest to the fact that on DMP basic reading/indication to the transfusion into 78.20/o was the shock, blood loss and their combination. The percentage of transfusions apropos of anaerobic infection in this stage is small and is explained by a small quantity of these complications on DMP.

Table 243. The distribution of casualties with the bullet break of the bones of shin in the stages of evacuations, in which was applied the first therapeutic immobilization, during the individual years of war (in the percentages).

(2) Этап	(1) Год войны					(7) В сред- нем за войну
	(3) Первый	(4) Второй	(5) Третий	(6) Четвер- тый		
ДМП	6,8	5,4	7,5	7,5	6,9	
ГБА	44,4	45,6	46,6	63,3	50,5	
ГБФ	40,1	41,8	41,4	26,7	37,4	
(8)Тыловой знакоспиталь	8,7	7,2	4,5	2,5	5,2	
(9) Всего . . .	100,0	100,0	100,0	100,0	100,0	

Key: (1). Year of war. (2). Stage. (3). The first. (4). The second. (5). The third. (6). The fourth. (7). On the average for war. (8). Rear evacuation hospital. (9). In all.

Table 244. Periods of the imposition of the first therapeutic immobilization with the bullet breaks of the bones of shin on the years of war in the percentages).

(2) Год войны	(1) Дни			(3)	(4)
	10	11-20	21 и более	Всего	
(5) Первый	54.6	25.5	19.9	100.0	
(6) Второй	51.2	23.6	25.2	100.0	
(7) Третий	65.9	16.3	17.8	100.0	
(8) Четвертый	75.7	17.8	6.5	100.0	
(9) В среднем	61.6	25.2	13.2	100.0	

Key: (1). Days. (2). Year of war. (3). and more. (4). In all. (5). The first. (6). The second. (7). The third. (8). The fourth. (9). On the average.

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Under conditions of KhPPG anaerobic infection already considerably more frequently served as reading/indication to the blood transfusion, i.e., in 24.30/o; this percentage again descends in the army and front line evacuation hospitals.

Entire above-mentioned gives grounds to draw the conclusion that the basic place of struggle with the anaerobic infection in the army areas were KhPPG. Considerable attention in all enumerated stages and

especially in DMP and in KhPPG was paid to the struggle with the primary anemia after blood loss. In the army ones and especially in the front line evacuation hospitals among the readings/indications to the transfusion of blood and blood-substituting fluids/liquids was raised the specific gravity/weight of such complications as sepsis (8.50/o in the front line area against 4.60/o in KhPPG); especially frequently the transfusions were produced for the purpose of stimulation (69.20/o in the front line ones, 42.20/o in the army evacuation hospitals against 20.4c/c in KhPPG).

From the analysis of medical-evacuation measures it follows that in the army, army and front line area to the treatment of casualties with the bullet break of the bores of shin was paid the serious attention by applying the qualified surgical aid, also, first of all of primary surgical processing.

In the beginning of war the percentage of operability was 48.5; however, being raised from year to year, it achieved 88.6 toward the end of the war.

Bulk of casualties were subjected to primary surgical processing in the army area (at DMP and partially in KhPPG of first line) within the early periods after wound, moreover during the war a number of operations/processes on DMP continuously was increased from 52.8 to

83.50/o, and a number operated in the first 6 hours after wound increased from 12.2 to 26.00/o.

Of the special features/peculiarities of the wounding shell, the structure of wound canal in combination with the form/species of the break bones to a considerable degree determined readings/indications to the processing and character/nature of the latter. Perforating bullet wounds with the simple break more rarely needed primary surgical processing and among all casualties with the bullet break gave the best clinical outcomes.

The skillful, thorough conducting of the primary surgical processing of soft tissues played primary role and to a considerable degree was determined the possibility to leave large/coarse fragments on the spot.

For the transport immobilization after primary surgical processing extensively was used wire splint. Deaf gypsum bandage as the method of therapeutic immobilization was used predominantly in the second echelon GBA.

Table 245. Readings/indications to the transfusion of blood and blood-substituting fluids/liquids with the bullet breaks of the bones of shin in the stages of evacuation (in the percentages).

(1) Этап	(2) Показания							(10) Итого
	(3) шок	(4) шок и кровопото- гера	(5) первич- ная ане- мия после кровопото- гера	(6) анаэроб- ная ин- фекция	(7) сеп- сис	(8) сочега- ние при- чин	(9) прочие	
ДМП	17,9	22,6	37,7	15,0	—	2,8	4,0	100,0
ХППГ	8,3	1,8	35,1	24,3	4,6	5,5	20,4	100,0
(11) Армейский эвакуо- госпиталь	—	—	27,0	17,3	7,8	5,7	42,2	100,0
(12) Фронтальной эвакуо- госпиталь	—	—	6,0	12,0	8,5	4,3	69,2	100,0

Key: (1). Stage. (2). Readings/indications. (3). shock. (4). shock and hemorrhage. (5). Primary anemia after blood loss. (6). anaerobic infection. (7). sepsis. (8). combination of reasons. (9). Other. (10). Entire (11). Army evacuation hospital. (12). Front line evacuation hospital.

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During the matched damages of bones and vessels during the primary processing was not not not always simultaneously conducted the dressing of the latter. This to a certain extent hampered clinical coursing of this group of wounds.

Bulk of amputations during the primary surgical processing was

produced as a result of the severity of trauma. Occasion for the amputations in another time was most frequently anaerobic infection.

The quality of primary surgical processing was sufficient to high ones, about which testifies the low percentage of repeated operations/processes in casualties in the army area.

Coursing treatment of the bullet breaks of the bones of shin in a front line and service area.

Clinical course of uncomplicated bullet breaks of the bones of shin.

Doctor of medical sciences the Lieutenant Colonel of medical service A. A. Nikitin.

The bullet breaks of the bones of shin relate to the heavy damages of supporting-motor apparatus. In the characteristic of anatomical changes in these breaks was given the frequency of the breaks of the individual bones of shin and it was indicated that most heavy of them, number of which includes breaks of both bones of shin, in half of the cases it was almost caused by mines, causing not only of the large decomposition of bones, but also damage of the soft tissues of shin, including neurovascular bundle; as it was already indicated, such damages were frequently ended by the amputation of

extremity.

For the course of bullet breaks of the bones of shin is typical the fact that with these breaks casualty cannot be moved, although many others, sometimes heavier, the wounds did not disturb statics. Clinical coursing was also different it depended on a number of factors and, in the first place, from the complex anatomical-topographical relations, which are characterized by the powerful/thick development of muscles in upper two thirds of shin, and also by presence on the shin of dense bone-fascial cisterns, which could condition the delay of infected contents and interfere with the emptying of pus.

The presence of the associated damage of other organs/controls and tissues and its character/nature, the complication of the shock of different degree by blood loss, the severity of the added infection, the character/nature of wound and wounding shell, form/species and the level of break, period and the character/nature of rendering to first aid and transport immobilization, periods and the volume of the primary surgical processing of wound, procedure of subsequent treatment, the general condition of casualty before the wound, age - all this had an effect on clinical coursing of bullet breaks of the bones of shin.

In a number of cases clinical coursing of bullet breaks of the bones of shin in principle differed little from coursing of closed break: the small little contaminated wound, the simple form of break and insignificant blood loss were not escorted/tracked by shock. Subsequently the general condition of casualty also suffered little; the temperature within the limits of week was subfebrile, and then came to the norm, pains with the sufficient immobilization disappeared; the process of the healing of wound and intergrowth of break proceeded smoothly and in 3-4 months attacked/advanced full/total/complete recovery.

As the example this smooth and uncomplicated coursing of bullet break of the tibia can serve the following observation.

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D. R., 20 years, 22/XII, 1943 obtained bullet wound in middle third of shin with the break of tibia bone.

On PMP was introduced antitetanus serum and was superimposed the splint of Cramer. On DMP 12 hours after wound produced splitting up of wound are bandaged the bleeding vessels.

29/XII is produced the immobilization of extremity by hypo-owl by cast.

7/II By X-ray examination is discovered a comminuted fracture of the tibia in middle third with a good standing of broken ends.

17/II casualty began to walk, loading extremity.

16/III in view of the slow healing of the wound of soft tissues produced carving are superimposed secondary sutures.

25/III the wound healed with primary tension.

12/IV wounded was discharged into the unit with the well gotten stronger corn, smooth scar and unlimited movements in the joints.

The given example illustrates smooth coursing after bullet comminuted fracture of the tibia, achieved by the in proper time produced primary surgical processing of wound and by the subsequent imposition of secondary suture. The early applied functional therapy in the form of walking with the load on the extremity contributed to the rapid reduction of the function of extremity.

However, many bullet breaks of the bones of shin were escorted/tracked by the fact or another complication (shock, blood loss, anaerobic or pyogenic infection), which attacked/advanced soon or through certain period after wound. Form/species and the character/nature of complications, and also the individual resistivity of the organism of casualty determined in this case form and severity clinical coursing of each wound individually.

In accordance with this to come to light/detect/expose the typical forms clinical coursing of bullet break of the bones of shin

is represented by difficult problem.

On the basis of given below data with good reason it is possible, however, to note the serious character/nature of these damages, and clinical coursing, in spite of significant successes in the treatment in comparison with other wars, it was escorted/tracked frequently by the severe complications whose all forms/species are systematic presented in volume 16.

Numerous complications, which were being developed both soon after the wound and in latter periods, occupied far not latter/last place with the bullet breaks of bones shins, which to a considerable degree perverted typical clinical coursing of these breaks. From a practical point of view it is important to establish/install, was observed generally smooth coursing of bullet breaks of the bones of shin and if it was observed, then as frequently. Data of the deepened development of the histories of illness for this question show that smooth clinical coursing of bullet breaks of the bones of shin, complicated either by associating wounds or by the added complications, was observed in different number of cases both with the breaks of both bones of shin and with the isolated/insulated breaks of tibial and fibular bone.

The examples this uncomplicated coursing are given above.

The frequency of the uncomplicated bullet breaks of the bones of shin can be described by following data in the percentages to a total number of breaks of this bone of the shin: break of both bones of shin - 1.3, one tibia - 7.8 and one fibular bone - 12.5.

From given data it is completely obvious, that smooth coursing of bullet breaks of both bones of shin was observed rarely.

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Somewhat better flowed/occurred/lasted the isolated/insulated breaks of the tibia and still better as this it was to be expected, flowed/occurred/lasted the isolated/insulated breaks of fibular bone (Table 246).

Hence it follows that most frequently uncomplicated coursing of bullet breaks of the bones of shin was observed in 1941. This is, first of all, explained by a military-tactical circumstances whose special features/peculiarities during the first year of war created such conditions, with which into the army therapeutic installations entered more than easily wounded, and also with certain increase in the severity of wounds in the years of war, which more narrowly was

discussed above.

During the offensive combat operations in 1943-1945, the escorted/tracked frequently by penetration fortified areas of enemy and minefields, wound of lower extremities they were heavier; smooth coursing of bullet breaks of bones of shin was noted during this period somewhat thinner/less frequent than in 1941, but it did not give large fluctuations subsequently.

It is important to trace which contributed smooth coursing of the breaks of the bones of shin. From this point of view it is necessary to subject to analysis the form/species of the wounding shell and the character/nature of wound, the form/species of the break of the bones of shin, period and the character/nature of primary surgical processing and clinical outcomes.

This analysis can be produced via the comparison of data on the questions touched upon concerning two groups of the casualties: with uncomplicated break and with complicated break (Table 247).

The group of casualties with the break of the bones of shin without the complications in comparison with the control room (casualties with the complicated break) was characterized by the following special features/peculiarities:

1. Bullet wounds in the group of casualties with the uncomplicated break it was more rare and a half times with the breaks of fibular bone and two times with breaks of both of bones; fragmentation - it is less one and a half times with the breaks of the tibia and five times with breaks of both bones.

2. Was more than perforating and less than blind-end wounds (on the average to 10.00/o).

3. Considerably more greatly it was observed light breaks, for example, perforated and edge/boundary (from 5.2 to 29.7o/o), and it is less than compound, for example, crushed fractures during damage of both bones of shin it was less almost 7 times.

4. Primary surgical processing was performed more rarely 1.5-2 times and besides within later periods.

Table 246. Frequency uncomplicated coursing of bullet breaks of the bones of shin on the years of the period of war (on 100 casualties in each year).

(2) Локализация перелома	(1) Год войны				
	1941	1942	1943	1944	1945
(3) Обе кости голени . . .	2,7	1,6	0,7	0,8	1,3
(4) Большеберцовая кость . .	15,3	7,3	8,8	6,7	4,2
(5) Малоберцовая кость . .	22,7	14,1	13,7	8,2	8,9

Key: (1). Year of the war. (2). Localization of break. (3). Both bones of shin. (4). tibia. (5). Fibular bone.

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5. Character/nature of primary surgical treatment was predominantly simple (more than splitting up, it is less than removals/distances of bone fragments).

6. Clinical outcomes were considerably better, for example, good outcomes it was more 2 1/2 times with breaks of fibular bone and 17 times with breaks of both bones.

Substantially important is the fact that the average duration of the stay in the hospitals of casualties with smooth conical coursing of bullet breaks of the bones of shin was two times less than all casualties with the break of the bones of shin.

Table 247. Distribution of casualties with complicated and uncomplicated break of the bones of shin according to form/species and character/nature of wound, form/species of break, character/nature and periods of primary surgical treatment and clinical outcomes (in the percentages).

(1) Группа раненых	(2) С несложным переломом			(3) С осложненным переломом		
	(4) Локализация перелома	(5) большеберцовая кость	(6) малоберцовая кость	(7) обе кости	(8) большеберцовая кость	(9) малоберцовая кость
(4a) Сопоставляемые данные						
(5) Вид ранения:						
(51) пулевое	71,3	70,0	88,0	50,0	46,5	34,3
(52) осколочное	28,7	30,0	12,0	50,0	53,5	65,7
(6) Характер ранения:						
(61) сквозное	80,0	82,4	85,2	68,1	72,5	78,5
(62) слепое	20,0	17,6	14,8	31,9	27,5	21,5
(7) Вид перелома:						
(71) дуговой и краевой	65,5	24,8	8,0	35,8	15,0	2,8
(72) косой, продольный и поперечный	21,3	4,6	16,0	12,7	17,3	9,2
(73) оскольчатый	11,6	67,2	68,0	42,5	56,7	35,0
(74) раздробленный	1,6	3,4	8,0	9,0	11,0	33,0
(8) Первичная обработка:						
(81) производилась	45,3	23,0	44,2	74,9	75,6	84,5
(82) не производилась	54,7	77,0	55,8	25,1	24,4	15,5
(9) Срок первичной обработки:						
(91) первые сутки	64,4	70,1	16,0	69,4	70,1	74,1
(92) позже первых суток	35,6	29,9	84,0	30,6	29,9	25,9
(10) Характер первичной хирургической обработки:						
(101) рассечение	73,0	50,0	72,2	63,2	55,5	27,4
(102) рассечение и иссечение	13,5	33,3	17,9	12,6	13,3	7,7
(103) рассечение и иссечение с удалением инородных тел	3,1	—	1,1	6,7	7,4	2,0
(104) рассечение и иссечение с удалением костных осколков	10,4	16,7	8,9	17,6	13,5	17,9
(105) прочие	—	—	—	9,9	10,3	45,0
(11) Клинические исходы:						
(111) хороший	92,5	89,6	60,7	25,6	32,4	3,5
(112) деформация	0,8	0,9	14,4	0,6	0,1	0,8
(113) контрактура	1,2	2,0	3,6	26,3	26,9	17,7
(114) прочие	5,5	7,5	21,3	47,5	40,6	78,0

Key: (1). Group of casualties. (2). With uncomplicated break. (3). With complicated break. (4). Localization of break. (4a). Comparable

data. (5). is more tibial bone. (6). fibular bone. (7). both bones. (8). Means of wound. (9). bullet. (10). fragmentation. (11). Character/nature of wound: (12). perforated. (13). blind. (14). Form/species of break. (15). perforated and edge/boundary. (16). by sand bar, longitudinal and. (17). cross. (18). fragmented. (19). crushed. (20). Primary processing. (21). it was produced. (22). it was not produced. (23). Period of primary processing. (24). first day. (25). it is later than first day. (26). Character/nature primary. (27). surgical processing. (28). splitting up. (29). splitting up and carving. (30). splitting up and carving. (31). with removal/distance of alien ones. (32). bodies. (33). splitting up and carving. (34). with removal/distance of bone ones. (35). fragments. (36). other. (37). Clinical outcome. (38). good. (39). strain. (40). contracture. (41). other.

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The analysis of the final outcomes of the bullet breaks of the bones of shin with smooth clinical coursing, and also given data, which relate to this group of casualties, with a certainty attest to the fact that smooth clinical coursing was observed predominantly during lightest damage of the bones of shin. Only by this it is possible to explain that the final outcome of the isolated/insulated breaks of tibial and fibular bone proved to be almost identical.

Treatment of the bullet breaks of the bones of shin in a front line area and in the rear.

Honored Scientist professor is the lieutenant general of medical service N. N. Yelanskiy.

Casualties with the bullet break of the bones of shin after primary surgical treatment underwent further treatment in the army, front line and rear evacuation hospitals.

For the analysis of the used methods and results of the treatment of casualties with the break of the bones of shin are undertaken two groups: the first group of the casualties, who finished treatment in front rear, and the second group of the casualties, who finished treatment in the deep rear (Table 248).

Into the first group entered the casualties with the lightest breaks (perforated and edge/bour ary) of the bones of shin, by breaks of one what - or the bone of shins whose treatment was brief and could be completed in the limits of front line therapeutic installations. Furthermore, into the same group entered casualties with the heaviest wounds of shin - crushed and multifragment, that

were complicated in the army and front rear by heavy suppurative or anaerobic infection. These casualties needed prolonged treatment in the rear, but we could not be there directed in view of their heavy condition and therefore they were held up in the front line hospitals. In the latter/last subgroup of the casualties, who finished treatment in the front line hospitals, naturally, was noted a significant quantity of amputations and lethal outcomes.

Into second group entered the casualties both with the lighter forms/species of break (perforated, edge/boundary and the break of one bone), which required the more prolonged period of treatment and with the heavier, but allow/assume evacuation (full/total/complete non-fragmented, crushed and multifragment).

Wounded first groups passed to the place, on which they finished their treatment, on the average of 4 stages, while wounded second groups - 5.5 stages.

For the comparative evaluation of the severity of the contingents of these wounded two groups we cite data about the associated wounds (Table 249) and the character/nature of the primary surgical processing (Table 250), capable of influencing coursing and outcomes.

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Preponderance in the first group of the associated wounds of skull, breast, stomach and pelvis characterizes this group as heavier.

Table 248. Distribution of casualties with the bullet break of the bones of shin according to the form/species of break (in the percentages) .

(1) Группа раненых заключивших лечение в госпиталях	(2) краев и дыра- тый	(3) Вид перелома			(7) Всего
		(4) полный неосколь- чатый	(5) сколь- чатый	(6) раздроб- ленный	
(8) Фронтальных	35,2	9,1	32,4	23,3	100,0
(9) Тыловых	21,0	12,0	44,3	22,7	100,0

Key: (1). Group those wounded finished treatment in the hospitals.
 (2). edge/boundary and perforated. (3). Form/species of break. (4).
 full/total/complete non-fragmented. (5). fragmented. (6). crushed.
 (7). total. (8). Front line. (9). rear.

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Comparing the character/nature of primary processing in these two groups, it is possible to ascertain that in the second group there was more than the untreated casualties (25.00/o) and it is more than the operations/processes of the removal/distance of bone broken ends (17.80/o). Processing did not most frequently undergo most easily casualties. The early radical processing of the breaks of the bones of shin with the removal/distance of bone broken ends also prevented the development of severe sharp/acute complications.

Is noted the significant difference in both dismantled groups in the time of rendering to the specialized aid with the bullet breaks of the bones of shin (Table 251).

In the first group of the casualties, who finished treatment in the front rear, into the first two days the specialized aid was shown/rendered into 34.70/o, whereas in the second group within its the same period they obtained only by 14.20/o of casualties. If one considers that the specialized aid usually proved to be first of all most heavily to casualties, also, with the most severe complications, then this also characterizes the first group as heavier.

Table 249. Associated wounds with the breaks of the bones of shin in casualties, finishing treatment in the front line and deep rear (in the percentages).

(2) Группа раненых с переломом костей голеней, закончивших лечение в госпиталях	(1) Сопутствующие ранения											(14) Всего
	(3) только мягких тканей	(4) проникающие ранения					(5) кроме перелома костей голеней, были				(13) и прочие комбинации	
		(6) череп	(7) лица	(8) грудь	(9) живота	(10) таза	(11) переломы костей верхних конечностей	(12) переломы костей нижних конечностей	(13) и прочие комбинации			
(15) Фронтальных	67,2	0,6	0,3	4,1	0,3	0,3	1,2	5,9	20,1	100,0		
(16) Тыловых	69,2	0,4	0,4	0,5	0,1	0,1	3,9	11,2	14,2	100,0		

Key: (1). Associated wounds. (2). Group of casualties with break of bones of knee, which finished treatment in hospitals. (3). only soft tissues. (4). penetrating wounds. (5). besides break of bones shins, were. (6). skull. (7). person. (8). breast. (9). stomach. (10). pelvis. (11). breaks of bones of upper extremities. (12). breaks of bones of lower extremities. (13). other combinations. (14). In all. (15). Front line. (16). Rear.

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Table 250. character of primary surgical processing in casualties with the bullet break of the bones of shin, finishing treatment in the front and the deep rear (in the percentages).

(2) Группа раненых с переломом костей голени закончивших лечение в госпиталях	(1) Рассечение, иссечение и характер первичной хирургической обработки											
	(3) Сочетанная обработка	(4) Рассечение	(5) Рассечение и иссечение	(6) С перевязкой сосуда	(7) С удалением инородных тел	(8) С удалением костных осколков и обработкой фрагментов кости	(9) С ампутацией	(10) Прочие операции	(11) Итого	(12) Не было произведено обработки		
(13) Фронтальных	2,8	48,5	12,0	3,1	6,2	12,0	12,0	3,4	100,0	15,8		
(14) Тыловых	2,1	45,8	11,0	3,8	4,9	17,8	13,0	1,6	100,0	25,0		

Key: (1). Splitting up dissection and the character/nature of primary surgical processing. (2). Group of casualties with break of bones of shin of those finished treatment in hospitals. (3). Matched processing ¹.

FOOTNOTE ¹. The "matched" processing consisted of several elements/cells from a number of those indicated of the table.
ENDFOOTNOTE.

(4). Splitting up. (5). Splitting up and carving. (6). With tying of vessel. (7). With removal/distance of alien ones those. (8). With removal/distance of bone fragments and processing of fragments of bone. (9). With amputation. (10). Other operations/processes. (11). In all. (12). It was not produced processing. (13). Front line. (14).

rear.

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Preponderance in the second group of wounded, obtained in third cases (34.50/o) the specialized aid in time from 10 to 30 days, characterizes the second group as lighter in composition of casualties.

Is of also significant interest the character/nature of the therapeutic immobilization, which was being used during the treatment of the bullet breaks of the bones of shin in the first and second group of casualties (Table 252).

In the first group of casualties predominated the immobilization of breaks by splints, which indicates either the light form/species of break, or, on the contrary, to heavy complication, which requires constant observation, frequent dressings and operations/processes for dealing with the developing infection. However, in the second group with the immobilization of the breaks of the bones of shin predominated deaf gypsum bandages, which indicates comparatively favorable coursing of break, which does not require frequent interventions.

The large part of the casualties with the bullet break of the bones of shin both in the first and in the second group transferred one or the other complication in the early period of wound process, and sometimes several complications (Table 253).

From wounded riskiest complications in the first group the greatest specific gravity/weight had a shock and anaerobic infection, whereas in the second group of casualties these complications were encountered much more rarely, which also characterizes the first group as heavier. This is completely understandable, since shock and anaerobic infection were encountered more frequently with the heaviest breaks of the bones of shins which served as basis for the delay of casualties in view of the heavy condition in the army and front area.

Table 251. Time of rendering specialized aid with the bullet breaks of the bones of shin from the moment/torque of wound in casualties, who finished treatment in the front line and deep rear (in the percentages).

(1) Группа раненых с переломом костей голени, закончивших лечение в госпиталях	(2) Время оказания специализированной хирургической помощи								(8) Всего
	(3) 1-2 часа	(4) 3-24 часа	(5) вторые сутки	(6) 3-6 сут	(7) 7-10 сут	(8) 11-20 сут	(9) 21-30 сут	(10) не устр. полностью	
(4) Фронтовых	7,8	3,8	23,1	19,2	23,1	15,4	3,8	3,8	100,0
(10) Тыловых	3,2	4,2	6,8	31,4	14,7	20,4	14,1	5,2	100,0

Key: (1). Group of casualties with fracture of the bones of knee, which finished treatment in the hospitals. (2). Time of rendering specialized surgical aid. (3). hours. (4). hour. (5). second day. (6). days. (7). it is not established/installed. (8). In all. (9). Front line. (10). Rear.

Table 252. Character/nature of therapeutic immobilization with the bullet breaks of the bones of shin in casualties, who finished treatment in the front line and deep rear (in the percentages).

(1) Группа раненых с переломом костей голени, закончивших лечение в госпиталях	(2) Характер лечебной иммобилизации				(7) Итого
	(3) шпиль	(4) глухая и оноччатая гипсовая повязка	(5) скелет- ное вы- тяжение	(6) прочие виды фиксация	
(8) Фронтальных	50,4	44,9	—	4,7	100,0
(9) Тыловых	34,7	64,8	0,3	0,2	100,0

Key: (1). Group of casualties with the break of the bones of knee finishing treatment in the hospitals. (2). Character/nature of therapeutic immobilization. (3). lug. (4). deaf and fenestrated gypsum bandage. (5). skeletal/skeleton traction. (6). other forms/species of fixation. (7). altogether. (8). Front. (9). Rear.

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A sufficiently large quantity of casualties (3.4 per 100) from a number of those finished treatment in the front line area transferred sharply flowing osteomyelitis, but nevertheless it did not have here this dissemination as in the deep rear where it it was more easily diagnosed.

In the group of the casualties, who finished treatment in the deep rear, predominated abundant festering in wound (35.90/o).

The rapidly flowing sepsis in the first group was observed approximately in 4 casualties, and in the second group - in 2 casualties of 100. suppurative arthritis was encountered somewhat more frequent in the second group (1.9 to 100).

By all casualty with the bullet break of the bones of shin, which finished treatment both in the deep rear and in the front line area, was conducted the complex treatment, which was consisting in surgical interventions (Table 254 and 255), immobilizations and the wide application of physiotherapy, therapeutic gymnastics and medicinal/medicamentous substances.

Among the operations/processes, produced by casualty of both groups in the army and army area, predominated the examination of wounds, the autopsy of suppurative flows and amputation, i.e., those operations/processes which most frequently were used with the sharp/acute complications of infection. Comparatively much (6.90/o in the first group and 3.80/o in the second group) the dressings of vessels were produced apropos of secondary hemorrhages. Fairly often was produced the removal/distance of bone fragments and of foreign bodies and processing fragments. The character/nature of surgical treatment in the front line area with the bullet breaks of the bones of shin is visible from Table 255.

Table 253. Frequency of the principal early complications in casualties with bullet break of the bones of shin, which finished treatment in the front line area and in the service area (in the percentages).

(1) Группа раненых с переломом костей голени, закончивших лечение в госпиталах	(2) Ранние осложнения					
	(3) шок	(4) обильное нагноение в ране	(5) анаэробная инфекция	(6) гнойный артрит	(7) быстро текущий сепсис	(8) остро текущий остеомиелит
(9) Фронтальных	13,2	15,7	17,2	1,1	3,8	3,4
Тыловых (10)	4,6	35,9	8,9	1,9	1,8	7,4

Key: (1). Group of casualties with the break of the bones of knee, which finished treatment in the hospitals. (2). Early complications. (3). shock. (4). abundant festering in wound. (5). anaerobic infection. (6). suppurative arthritis. (7). rapidly flowing sepsis. (8). sharply flowing osteomyelitis. (9). Front line. (10). Rear.

Table 251. Surgical treatment (besides the primary processing), which was being used by casualty with the bullet break of the bones of shin in the army and army area (in the percentages).

(1) Группа раненых с переломом костей голеней, закончивших лече- ние в госпиталях	(2) Название операции										(12) Всего
(3) реципи раны	(4) удаление инородных тел и кост- ных оскол- ков	(5) обработка фрагментов кости	(6) иссечение тканей	(7) перевязка сосудов	(8) ампутация	(9) реампутация	(10) секвестрек- томия	(11) прочие			
(13) Фронтальных . . .	14.6	13.8	2.3	18.6	6.9	21.5	2.3	2.3	7.7	100.0	
Задних (14) . . .	15.7	12.1	2.3	21.7	3.8	38.7	1.1	1.8	2.8	100.0	

Key: (1). Group of casualties with the break of the bones of shin, which finished treatment in the hospitals. (2). Name of operation/process. (3). examination of wound. (4). removal/distance of foreign bodies and bone fragments. (5). processing of fragments of bone. (6). autopsy of flows. (7). dressing of vessels. (8). amputation. (9). re-amputation. (10). sequestrectomy. (11). other. (12). In all. (13). Front line. (14). Rear.

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Among the operations/processes, produced with the breaks of the bones of knee in the front line area, noticeably increased (on the comparison in army) the specific gravity/weight of sequestrectomies, produced in the first group in 47.6c/o of casualties, and the secondly - in 31.0c/o of casualties. was lowered a quantity of

amputations and exarticulations in both groups (13.50/o and 14.40/o), decreased quantity of autopsies of flows and phlegmons, especially in the first group. The removal/distance of foreign bodies and bone broken ends in the front line area was produced so frequently as in the army area.

Entire character/nature of operational aid indicates a change of the character/nature of complications in the front line area.

Shock and anaerobic infection, that were being observed more frequent in the army and army area, in the front line area changed the sharply flowing sepsis, which caused the need for use/application in both groups of a significant number of amputations, and osteomyelitis (sequestrectomy): a number of sequestrectomies proved to be considerably greater in the first group of the casualties, who finished treatment in the front line area, whereas in the second group sequestrectomies were produced mainly in the rear.

In the second group of casualties were observed mainly the sharp/acute forms of osteomyelitis apropos of which in the front line installations was necessary to make equal with the sequestrectomies (31.00/o) and the autopsy of flows (21.70/o).

In casualties with the bullet break of the bones of shir in the

hospitals of the deep rear were observed the following complications: osteomyelitis (15.10/o), contracture 27.40/o), the combination of osteomyelitis with contracture (36.00/o), pathological stump and trophic ulcers (19.00/o), and other (2.50/o).

Most frequently among late complications, which were being encountered in the deep rear with the bullet breaks of the bones of shin, were observed osteomyelitis contractures, separately and in the combination, that comprised in amount of 78.50/o. the following in the frequency among late complications was trophic ulcer or pathological stump of the shins which on the whole composed 19.00/o. Among other complications the aneurisms of vessels composed 1.00/o, urolithiasis - 0.20/o, sepsis - 0.20/o, the delayed consolidation - 0.90/o, etc. - 0.20/o.

The surgical treatment of the bullet breaks of the bones of shin in casualties in the deep rear considerably changed its character/nature in comparison with the preceding stages. Most frequent from applied surgical interventions in these cases it was sequestrectomy (60.40/o).

Table 255. Surgical treatment of the bullet breaks of the bones of shin in casualties, who finished treatment in the front line and service area (in the percentages).

(1) Группа раненых с переломом костей голени, закончивших лечение в госпиталях	(2) Название операции										
	(3) осмотр раны	(4) удаление осколков кости и инородных тел	(5) обработка осколков фрагментов	(6) иссечение затек	(7) перевязка сосуда	(8) ампутация	(9) реампу- тация	(10) секвестро- эктомия	(11) прочие	(12)	(13)
(13) Фронтальных	2,9	12,0	1,4	8,6	1,0	13,5	2,4	47,6	10,6	100,0	
(14) Тыловых	4,5	12,2	4,5	21,7	1,9	14,4	4,3	31,0	5,5	100,0	

Key: (1). Group of casualties with the break of the bones of shin, which finished treatment in the hospitals. (2). Name of operation/process. (3). examination of wound. (4). removal/distance of bone broken ends and foreign bodies. (5). processing bone fragments. (6). autopsy of flows. (7). dressing of vessel. (8). amputation. (9). re-amputation. (10). sequestrectomy. (11). other. (12). in all. (13). Front line. (14). Rear.

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The amputations of extremities composed only 1.10/o then re-amputation, which had as a goal the correction of stump, they were noted into 17.80/o of all operations/processes. The autopsy of suppurative flows, the removal/distance of foreign bodies and processing bone fragments comprised in the amount only of 9.00/o.

Significant percentage (11.7) comprised other operations/processes, among which bulk composed surgical interventions, directed toward the occlusion of wound (carving of wound with the subsequent suture, the transplantation of skin, etc.).

The volume of the operational aid, which was being used in the deep rear during the treatment of the bullet breaks of the bones of shin, attests to the fact that the threat of early severe complications already passed and remained only the less sharply flowing complications, mainly from the side of bone wound in the form of osteomyelitis.

Casualties, who finished treatment in the front rear, transferred on the average each on 1.3 operations/processes (from number of those operated), and which finished treatment in the deep rear - 1.6 operations/processes.

The following factor, which had high value in the complex treatment of the bullet breaks of the bones of shin, was the immobilization of break. As it was already shown above (table 252), by the predominant form/species of the immobilization of the bullet breaks of the bones of shins whose treatment ended in the rear, there was the deaf gypsum bandage, superimposed into 64.80/o. The different genus of splint, including gypsum, were used into 34.70/o.

According to the data of the deepened development of the histories of disease/illness, during the treatment in the rear gypsum bandages with the wadded lining were used into 18.00/o, without the wadded gasket - into 21.10/o, it is unknown with the gasket or without it - into 56.20/o and fenestrated gypsum bandages - into 4.70/o. After all as most widely used was the method of treatment deaf gypsum bandage without any gasket, then it is necessary to consider that in all those cases in which about the gasket it was not mentioned, was used precisely deaf gypsum bandage without wadded lining.

Significant specific gravity/weight in the treatment of the bullet breaks in the deep rear occupied busbar/tire bandages (34.70/o of all cases of the bullet breaks of the bones of shin). This is explained by the fact that a large number of cases of acute and chronic osteomyelitis forced surgeons frequently to resort to active surgical interventions for the removal/distance of sequestrations, foreign bodies and autopsy of suppurative flows.

Clearly insufficiently was used with the bullet breaks of the bones of shin the method of skeletal/skeleton traction/extension, namely, based on materials of the deepened development of the

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histories of disease/illness, in the rear evacuation hospitals in all into 0.30/o.

During the treatment of the bullet breaks of the bones of shin with gypsum bandages it was necessary repeatedly to change them both for surgical interventions and as a result of the soaking of gypsum (table 256).

Table 256. Distribution of casualties with the break of the bones of shin according to a number of shifts/reliefs of gypsum bandage (in the percentages) .

(1) Количество смен гипсовой повязки					(3) Повязка не менялась	(4) Контроль через окно
1	2	3	4	(2) 5 и больше		
18,7	7,5	2,8	0,9	30,1	37,8	2,2

Key: (1). Number of shifts/reliefs of gypsum bandage. (2). and it is more. (3). Bandage was not changed. (4). Supervision through window.

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From the preceding information it is evident that it is somewhat more than in third of cases, bandage was not changed to the healing of fracture, almost in third of cases (30.10/o) it was changed five and more than once. This frequent shift/relief indicates, on one hand, to the severity of complication, that required of the reiterative shift/relief of bandage for the supervision and the treatment, and on the other hand - surgeons' special sympathies to this method of treatment. Evidently, among these 10.10/o of bullet breaks of the bones of shin most of all was readings/indications to the skeletal/skeleton traction/extension.

From other methods, which were being used for the treatment of the bullet breaks of the bones of shin both in the first and in the second group, it is necessary to note transfusion of the blood (table 257).

From the preceding information it is evident that in the first group of casualties the blood transfusion most frequently was produced in army KhPPG, where proved to be specialized aid and where were revealed/detected the frequently most severe wound complications - shock and anaerobic infection. the following place in the frequency of transfusion occupy the front line evacuation hospitals, in which was conducted the struggle with the gaseous infection and rapidly progressing osteomyelitis and by sepsis. Almost so frequently as in the front line evacuation hospitals, into 20.60/o of cases, is produced the blood transfusion in DMP. As reading/indication to the blood transfusion served shock, anemia and sharply flowed/occurred/lasted anaerobic infection. In 16.40/o of cases by casualty with the bullet break of the bones of shin in the different stages were produced the repeated blood transfusions.

By the casualty of the second group, who finished treatment in the deep rear, the maximum number of transfusions was produced in rear evacuation hospitals (26.90/o); in order to raise general/common/total resistance of organism for the purpose of

struggle with the chronically flowed/occurred/lasted infection. The same quantities (26.80/o) of the blood transfusions was made casualty in the different stages repeatedly. In the army, army and front line area by the casualty of the second group was produced less transfusions than by the casualty of the first group, apparently in connection with lighter coursing of bullet breaks.

During the treatment of the larger part of the casualties with the bullet break of the bones of shin both in the first and in the second group was used the physiotherapy, therapeutic gymnastics and medicinal agents (table 258).

From the auxiliary methods of treatment most frequently was used the physiotherapy into all forms/species and therapeutic gymnastics, which were necessary in all cases of the bullet breaks of the bones of the shin when casualties left the condition of shock, sharp/acute anemia, anaerobic infection and sepsis.

Table 257. The distribution of casualties with the bullet break of the bones of shin in the stages of evacuations, in which was produced the transfusion of blood (in the percentages).

(1) Группа раненых с переломом костей голени, за- кончивших лече- ние в госпиталях	(2) Этап								(9) Всего
	ДМП	ХППГ	(3) армей- ский ЭГ и СЭГ	(4) Фронт- ов ЭГ и СЭГ	ГЛР	тыло- вой ЭГ	про- чие этапы	(7) на не- скольких этапах	
(9) Фронтовых . . .	20,6	27,6	8,3	21,7	1,2	—	4,2	16,4	100,0
(10) Тыловых . . .	13,6	12,2	6,8	11,7	0,3	26,9	1,7	26,8	100,0

Key: (1). Group of casualties with the break of the bones of shin, finishing treatment in the hospitals. (2). Stage. (3). army, EG and SEG. (4). front EG and SEG. (5). rear. (6). other stages. (7). in several stages. (8). In all. (9). Front line. (10). Rear.

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Among the medicinal agents, which were being used during the treatment of the bullet breaks of the bones of shin, predominated sulfanilamides, but the main place in the treatment of the bullet breaks of the bones of shin just as the breaks of other tubular bones and their complications, occupied surgical interventions; sulfanilamides and other antiseptics only supplemented them.

The average duration of stay on the cot of casualty with the bullet break of the bones of shin was equal in the first group of 4.3

months, and in the second group - 5.7 months. lesser periods of treatment in the first group must be referred due to both more than the lungs and the heaviest breaks, ending with amputation or by lethal outcome in the army, army and front line area.

The periods of the education of strong/durable callus with the bullet breaks of the bones of shin in such cases where it was possible to come to light/detect/expose on accurate indications in the histories of disease/illness or on the basis of X-ray photographs, on the average comprised for the casualties of the first group of 2.2 months, and for the casualties of second group - 2.8 months.

Clinical outcomes in casualties, who finished treatment in the front line area and in the deep rear, considerably were distinguished (Table 259).

Analyzing represented data, it is necessary to note the preponderance of good outcomes in first group (53.80/o) in comparison with the second (22.30/o). This is explained by a large quantity of incomplete breaks, and also lighter breaks of one bone of shins whose treatment finishing in the front rear.

Table 258. Distribution of the auxiliary methods of the treatment of the bullet breaks of the bones of shin (in the percentages).

(1) Группа раненых с переломом костей голени, заключивших лечение в госпиталях	(2) Вспомогательные методы лечения			
	(3) сульфанил- амиды	(4) сульфанил- амиды и дру- гие антисепти- тики	(5) витамины, фаги и анти- септики в разных соче- таниях	(6) физиотерапия, лечебная гимна- стика и лекар- ства в разных сочетаниях
(7) Фронтowych	2,0	17,1	23,6	57,3
(8) Тыловых	0,3	6,7	6,5	86,5

Key: (1). Group of casualties with the break of the bones of shin, which finished treatment in the hospitals. (2). Auxiliary methods of treatment. (3). sulfanilamides. (4). sulfanilamides and other antiseptics. (5). vitamins, phages and antiseptic in different combinations. (6). physiotherapy, therapeutic gymnastics and medicine in different combinations. (7). Front line. (8). Rear.

Table 259. Clinical outcomes in casualties with the bullet break of the bones of knee, which finished treatment in the front rear and in the deep rear (in the percentages).

(1) Группа раненых, закончивших лечение в госпиталях	(2) Клинические исходы										(12) Всего
	(3) хороший функциональ- ный в анато- мический результат	(4) послед- ствия по- врежде- ния нервов	(5) контрак- тура	(6) анккло- з	(7) лож- ный сустав	(8) культя	(9) остео- миелит	(10) комби- нир- ннх исхо- дов	(11) про- чие		
(13) Фронтальных	53,8	5,0	16,3	1,1	1,4	6,2	7,8	0,8	7,6	100,0	
(14) Тыловых	22,3	8,5	22,4	2,7	2,0	19,5	14,0	4,8	3,5	100,0	

Key: (1). Group of the casualties, who finished treatment in the hospitals. (2). clinical outcomes. (3). good functional and anatomical result. (4). consequence on damage of nerves. (5). contracture. (6). ankylosis. (7). dummy joint. (8). stump. (9). osteomyelitis. (10). combination outcomes. (11). other. (12). In all. (13). Front line. (14). Rear.

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Significant specific gravity/weight in clinical outcomes had contractures - 22.40/o (in the second group) and 16.30/o (in the first group). This is explained, first of all, by the severity of the damages, which draw in frequently into the pathological process and the adjacent joints, and frequent cases by the complication of osteomyelitis which required prolonged treatment in the immobile

bandage.

Certain descent in the number of contractures it would be possible to achieve by the more frequent use/application of skeletal traction/extension, since it presents more than possibilities to put to use functional treatment. With the immobilization by deaf gypsum bandage it would be possible to even more lower a number of contractures by more active therapeutic gymnastics and by the more systematic and earlier designation/purpose of walking in the gypsum bandage.

Osteomyelitis in casualties, who finished treatment in the front line area, composed 7.80/c, and in the second group - 14.00/c. So high a percentage of osteomyelitis, which darkens the clinical outcomes of bullet breaks of the bones of shin, in essence must be referred due to the severity of the anatomical decomposition of bones and their surrounding soft tissues. A doubly larger number of cases of osteomyelitis in the second group is explained by the fact that bulk of casualties with osteomyelitis needed long-term treatment in the rear.

Attempt to decrease a quantity of the complications of osteomyelitis by the more radical processing of bone wound and wound of soft tissues or by the more radical resection of bone fragments

during the treatment of bullet osteomyelitis was not crowned by success. In spite of the radically produced primary treatment of bone wound or the cross sub-periosteal resection of fragments and fragments of bone, precisely, in these cases most frequently and were observed subsequently heavily flowed/occurred/lasted osteomyelitis, sepsis and other complications.

By the example of this complication of osteomyelitis, required prolonged treatment and repeated operation/process, in spite of the radically produced primary surgical processing of wound with the removal/distance of bone broken ends, can serve the following observation.

K., A. P., 38 years, was wounded 22/IX 1944. On PMP there was made the diagnosis: perforating fragmentation wound in lower third of right shin with the damage to bone, was introduced antitetanus serum and was superimposed the splint of Cramer. 4 Hours after wound on DMP is produced splitting up of wounds with the carving of the crushed tissues with the removal/distance of the free bone broken ends of tibia. Is superimposed bandage with Rivanol and splint of Cramer.

28/IX to casualty in KhPPG is superimposed deaf gypsum bandage to the middle of thigh.

18/X in the X-ray photograph was discovered a comminuted fracture of tibia without the displacement of broken ends.

30/XI was taken/removed gypsum bandage and were discovered the consolidation of fracture, the limitation of movements in the knee and talocrural joint; wound pure/clean, they are epithelialized well from the edges. Is assigned the therapeutic gymnastics also physiotherapy (ozocerite).

11/XII, in view of the presence of unhealing fistula, is produced under sedation operation/process - removal/distance of fine/small bone sequestrations, and also projecting edges of sequestral cavity.

31/I under the local anesthesia produced the scraping out of fistula courses are removed fine/small bone sequestrations.

10/V 1945 it is discharged into the unit with the healed wound and healed break with the full/total/complete volume of movements in the knee and talocrural joint.

In this case soon after wound (after 4 hours) was produced radical primary surgical processing with the removal/distance of the free fragments of bone and the carving of the contused soft tissues,

and nevertheless in casualty nevertheless subsequently developed osteomyelitis, which required double surgical intervention.

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Deserves attention the fact that, in spite of the low arranged/located wound of shin (in spite of the complication of osteomyelitis), because of the in proper time taken measures - therapeutic gymnastics and the physiotherapy was obtained a good functional result.

It means, the reason for osteomyelitis lies not in the insufficient radicalism of primary surgical processing, but in a deficiency in the general/common/total resistivity of organism and in the very essence of pathoanatomical changes in the bones with the bullet wounds, so/such in detail studied by our Soviet surgeons and anatomical pathologists (I. V. Davydovskiy, A. V. Smol'yannikov, S. M. Derizhanov et al.).

The given position/situation is illustrated by the following two examples.

E., S. F. 43 years, 26/II 1944 obtained wound by the fragments of the shell of middle third of right shin, right pelvic region and

right nates. On PMP are superimposed the bandages and is introduced antitetanus serum. On DMF is produced splitting up of wound in the region of pelvis.

In KhPPG are removed the fragments from the right shin and the nates.

23/III in the evacuation hospital is removed metallic fragment from the wound on the shin, screw was discovered the crushing of the tibia. It was treated by dressings and immobilization by gypsum cast.

25/V in the X-ray photograph is discovered a comminuted fracture of middle third of right tibia with a large quantity of fine/small sequestrations.

31/V - operation/process under the cerebrospinal anesthesia. Is cut all over scar on the front face of right shin. Is discovered area with the fine/small sequestrations which are freely removed; the projecting edge of tibial bone cut off by Luer forceps. Area is powdered with streptocide; skin was sewn with drainage.

23/VI casualty is represented to the commission with the grown together break of the tibia, but with the phenomena of chronic

osteomyelitis in the region of break and with the traumatic damage of right sciatic nerve.

In the given case there was a heavy multiple fragmentation wound of nates and shin with the break of the tibia and damage of sciatic nerve. The wound of the tibia was complicated by osteomyelitis, in spite of primary surgical processing with the removal/distance in KhPPG of bone broken ends and metallic foreign body in the evacuation hospital; casualty it was discharged with two severe complications - osteomyelitis and consequences of the damage of sciatic nerve.

In the following observation there was a multiple fragmentation wound of both shins with the break of bones and with the complication of anaerobic infection. In spite of the break of bones and heavy infection, in this case of the complication of osteomyelitis it did not advance.

S-ov Ye. P., 35 years, was wounded by the fragments of the mine 8/VI 1943. On PMP is set the diagnosis; fine/small fragmented blind wounds with the damage of bones of both of shins, wound of face and left hand. Was here introduced antitetanus serum, were superimposed bandages and wire splints.

On DMP during the same day there was noted: casualty in the

heavy condition of shock. On front/leading surface of both shins to 50 wounds of different value - from 0.5 to 1.5 cm in the diameter, damage of bones. To the wounds are superimposed the bandages, extremities are immobilized by the splints of Cramer. Is introduced antigangrene serum, solution of salt, glucose and morphine.

In a day/every other day, when the condition of casualty was improved, is produced under the local anesthesia sectioning of some wounds on both shins. daily was introduced on 25000 units of antigangrene serum. 10/VI (in KbPFG) is added on the right shin the section/cut of skin, fascia and muscles. Temperature reached 38.5°. Pulse of 120 strikes/shocks per minute; the tongue of dry; bandages get wet serous foras/species by fluid/liquid.

12/VI with the dressing on the left shin are discovered muscles with the the gray film, color of boiled meat; on the right shin from the sections/cuts were secreted the gas bubbles. Is assigned intravenous introduction of antigangrene serum with the physiological solution 1000 ml and of C.Ho/c solution of streptocide under the skin and the cardiac substances, inward fault. Is made the transfusion 250 ml of conserved blood.

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20/VI on the dressing it is noted: rose-colored color muscles bulge out from the wound, it is easy bleeding, there is a significant swelling of soft tissues of shins, but there is no crepitation and liberation of gas.

21/VI the temperature began to descend. 23/VI is discovered the sharp/acute suppurative inflammation of middle ear.

26/VI it is noted, that the phenomena of anaerobic infection calm down.

30/VI to both shins are superimposed deaf gypsum casts.

To casualty in the latter/last 2 weeks is produced several times the blood transfusion on 250 ml.

10/VII on the radiograms is visible comminuted fracture of both bones of middle third of right shin with the small lateral

displacement of broken ends and comminuted fracture of lower third of the tibia of left shin with the satisfactory standing of broken ends. In the region of fracture and in soft tissues of both shins are determined many metal fragments.

2/VIII gypsum bandages are partially removed with the release of knee joints; is assigned therapeutic gymnastics.

15/VIII gypsum bandages are taken/removed, is noted a good consolidation of breaks on both shins.

21/IX casualty began to walk with the aid of the crutches, loading both feet.

In the X-ray photograph of 20/X 1943 is determined break of both bones of right shin in the stage of formation of the callus. There is a small displacement at angle, in the center of marrow area around the foreign bodies is evident the rarefaction/evacuation of bone.

17/XI casualty is directed toward commission with the healed wounds and the limitation of mobility in the talocrural joints.

Observation data is the example of mine fragmentation wound of both shins with the break of bones, which was complicated by

anaerobic infection, but because of the in proper time taken measures (operation/process, serctherapy, sulfanilamide therapy, the blood transfusion), that ended happily.

In spite of the presence of foreign bodies in the region of the break of bones and in the soft tissues and the abandonment of all bone broken ends on the spot during the primary primary processing, the complication by osteomyelitis did not advance.

The attempt to purely mechanically solve the problem of prophylaxis and treatment of such heavy changes in the bone tissues without the accounting to the general/common/total resistivity of organism and to the essence of anatomical changes in the region of wound could not be crowned by full/total/complete success. For this purpose must be drawn other methods of the actions on entire organism, which in combination with the operational ones can lower a number of cases of bullet osteomyelitis. Among these substances it is necessary to name/call first of all antibiotics.

Stumps after amputation with the bullet breaks of the bones of shin composed 6.20/o in the first group and 19.50/o the secondly. Such significant (three times) preponderance in the clinical outcomes of amputation stumps in the group is secondly explained not by the large number of amputations, produced in the deep rear by casualty

with the break of the bones of shin, but fact that they are wounded after the amputations, produced in the army and army area, they finished treatment in the deep rear and therefore in the final clinical outcomes they were included in the second group.

Dummy joints are noted in the clinical outcomes of the first group of the breaks into 1.4c/o of cases, and the second group - into 2.0o/o of cases.

Isogonal magnification of the quantity of dummy joints in the clinical outcomes of the casualties of the second group is explained by the fact that their unit was formed as a result of radical surgery apropos of bullet osteomyelitis of the bones of shin.

The reason for the education of dummy joints after the bullet breaks of the bones of shin lies/rests also at the massive decomposition of bone and soft tissues.

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The abandonment of the fragments of bone leads subsequently to the severe complications - to gasous phlegmone, sepsis, osteomyelitis. The radical removal/distance of fragments, in particular during the first day after wound, somewhat decrease the

danger in the anaerobic infection also of sepsis, but it is frequently escorted/tracked by the phenomena of shock, but the main thing, does not always prevent subsequently the complication of osteomyelitis. If nevertheless it is possible to avoid these Scilla and Kharibda then, after all, is obtained by if the dummy joint (is more accurate, the extensive defect of bone), either contracture or ankylosis.

Prophylaxis of dummy joint after the bullet breaks of the bones of shin, just as osteomyelitis, is the combination of saving relation during the primary surgical processing to the large/coarse bone fragments, connected with the soft tissues, and the simultaneously and subsequent uses/applications of antibiotics. Antibiotics must aid healing of bone broken ends with the lowered/reduced regenerative capability, similar healing of the grafted/transplanted under sterile conditions autotransplants.

The postwar experiment/experience of the treatment of osteomyelitis of different origin by penicillin gives all bases to outline in this direction of the prospect for prophylaxis and treatment of bullet osteomyelitis, ankylosis and other pathological conditions, connected with the infection of necrotic bone tissue.

Summing up the special features/peculiarities clinical coursing

and treatment of casualties in the hospitals of the rear, it should be noted that are wounded with the bullet break of bones the shins, which finished treatment in the front rear, they passed on the average 4 stages, and those finished treatment in the deep rear - on the average of 5.5 stages.

In the first group predominated the casualties with the lightest, and also with the heaviest (nontransportable) break of the bones of shin.

In casualties, who finished treatment in the front rear, in half of the cases (into 50.40/c) was used the immobilization by splints, also, into 44.90/o of cases - immobilization by deaf gypsum bandage.

In casualties, who finished treatment in the deep rear, was used more frequently the immobilization by deaf gypsum bandage (64.80/o).

In casualties, who finished treatment in the front rear, from a number of early complications predominated the complications of shock, by anaerobic infection and by the sharply flowing sepsis. Casualties, who finished treatment in the deep rear, had more than the complications of osteomyelitis, and in them more frequently was encountered the abundant festering of wound.

In troop and army rear in casualties with the break of the bones of shin from the operations/processes predominated the examination of wounds, the autopsy of suppurative flows, amputation, removal/distance of bone broken ends and foreign bodies; in the front line area - sequestrectomy and amputation, while in the deep rear - sequestrectomy and re-amputation.

Wounded first groups transferred in the average each on 1.3 operations/processes (from operated), while wounded second groups - on 1.6 operations/processes.

In 30.10/o of the casualties, who finished treatment in the deep rear, gypsum bandage was changed five and more than once.

Skeletal/skeleton traction/extension with the bullet breaks of the bones of shin was used rarely - into 0.30/o of cases.

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The blood transfusion, physiotherapy and therapeutic gymnastics played significant role as the auxiliary methods of treatment with the bullet breaks of the bones of shin.

Great quantity (53.80/o) of good anatomical and functional

results was obtained in the first group of the casualties, who finished treatment in the front rear; in the deep rear they composed 22.30/o.

Contracture - one of the most frequently encountered outcomes next to the bullet breaks of the bones of shin in casualties, who finished treatment in deep rear (22.40/o).

Osteomyelitis composed 7.80/o of clinical outcomes of the first group and 14.00/o - second group.

Stumps after the amputations of shin in the outcomes of the first group composed 6.20/o and in the outcomes of the second group - 19.50/o.

Dummy joints in the first group were observed into 1.40/o of cases, and in the second group - into 2.00/o of cases.

In spite of the heavy damages of bones and soft tissues, with the bullet breaks of the bones of shin, because of the early use/application of primary surgical processing and specialized aid, are obtained relatively favorable results.

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Chapter V.

Closed breaks of the bones of extremities.

Special features/peculiarities of the onset of the closed breaks of the bones of extremities, their diagnosis treatment in war.

Professor General Major of medical service S. A. Novotel'nov.

The materials, which throw light on the questions, which concern the closed breaks of the bones of extremities in war, for the past wars there is not. Therefore the present investigation, which relates to the Great Patriotic War, is unprecedented.

In order to come to light/detect/expose the reasons, which call in war the closed breaks of long tubular bones, and to show the results of their treatment, and to also in parallel come to light/detect/expose the best organization of preventive measures for the more successful results of their treatment, was carried out the detailed study of the histories of the disease/illness and other materials on the closed breaks of the long tubular bones of the upper

and lower extremities, assembled in by military-medical museum.

The large part of the closed breaks was obtained in the army area. During the study of the facts, consequences of which were the closed breaks, it was discovered, that two thirds of all closed breaks arose as a result of straight/direct force from the side of the falling/incident solid objects/subjects in contrast to the closed breaks of peacetime, which appear most frequently as a result of indirect violence.

The diagnosis of the closed breaks presented difficulties mainly in the sense of the refinement of the character/nature of break and position/situation of broken ends. Under conditions of the foremost stages of evacuation the diagnosis was placed frequently only clinically, without the X-ray photographs. The preferred majority of the closed breaks underwent X-ray supervision in the front line and rear evacuation hospitals after the arrival of patients with this break into the specialized hospital.

Transport immobilization with the closed breaks was produced by predominantly standard metallic and wooden splints. In of all two thirds cases of the closed breaks these splints were laid during the first day, in the remaining cases - it is later.

With the closed breaks of the long tubular bones of upper extremity metallic splints more or less satisfactorily fix/record the place of break all the time of the evacuation of patient; however, as far as extremities are concerned lower, then as with breaks of both bones of shin, so in particular with the breaks of thigh even best of them - Cramer splint cannot ensure effective rest for the victim of extremity.

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For the transport with these breaks it is better to put to use the splints of Diedrich. These splints were used into 63.50/o of cases. In certain cases was observed the prolonged treatment of patients with the closed break of the bones of extremities in the transport splints, that was being conducted in many stages. More than 2/3 injured/damaged with the closed break of bones extremities passed from two to four stages and about 1/5 - five-six stages before arrived into the specialized front line or and rear evacuation hospital, in this case therapeutic immobilization was superimposed to one half of patients to 4 days, and another - is still later. It is not surprising that within this time in the unit of the patients was increased the displacement of broken ends, which impedes reposition in the specialized hospital. Before the imposition of transport splint the repositions of broken ends did not produce, yes even it

was not sense it make, since the busbar/tire immobilization indicated could not hold down/retain broken ends in the attached by it position/situation. It is logical that setting of broken ends was necessary to deposit to further stages when it was possible to apply after reposition most effective immobilization - circular gypsum bandage or skeletal/skeleton traction/extension.

Basic therapeutic aid with the closed breaks of long tubular bones was rendered in specialized hospitals. In the more mild cases the treatment was conducted in the general-surgical army and front line evacuation hospitals. The heavier cases reached the rear evacuation hospitals where there were all possibilities of the specialized treatment and where was finished treatment. However, reposition was produced frequently within the sufficiently late periods when the displaced broken ends managed more or less to be fixed/recorded in the incorrect position/situation. For eliminating the displacement of broken ends with the closed breaks of diaphysis of both bones of shin, especially with the breaks of thigh, it was necessary to use skeletal/skeleton traction/extension.

As basic therapeutic method after reposition or traction/extension served gypsum bandage, in the majority of the cases circular. Only with the breaks of forearm more frequently was used longette gypsum bandage.

From physical methods the reductions of function of the removal/taking of gypsum bandage with the closed breaks of the bones of extremities were commonly used thermal physiotherapy, the therapeutic exercise and thinner/less frequent - massage. With the aid of the massage were eliminated stagnant phenomena in the capillaries and local edema in the damaged and cicatrizing tissues, thereby was reduced the function of muscles. The function of muscles improved also by use/application following the massage physiotherapy and therapeutic exercise. Fibrous layerings after exudate best anything yielded to grinding on the mechano-therapeutic apparatuses.

The most frequent complication, which limits function after the intergrowth of the closed breaks, were the contractures of the joints, predominantly arranged/located extremally from the break. On the upper extremity where the motor function has fundamental importance, the contractures of joints were observed into 2/3 total quantities of breaks. third of patients with the contractures were discharged by that completely cured. With the breaks of the bones of shin and thigh of contractures it was less (39.0 and 55.0⁴₁). Further observations showed that these contractures were nonpersistent and in the significant majority of the cases they disappeared.

Investigating anatomical outcome with the joined closed breaks in war, they revealed/detected 47.0c/o of various kinds of strains and shortenings of the broken extremity.

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To the complications with the closed breaks of the bones of extremities they related to 6.0c/c stable paralyses of the peripheral nerves, damaged with the occurred trauma.

The delayed intergrowth of broken ends with the closed breaks of the bones of upper extremities was observed only into 3.0o/o with the breaks of knee into 3.5o/o, with the breaks of thigh - into 7.0o/o. The periods of the treatment of the closed breaks under conditions of war differed little from the duration of the treatment of the breaks in peacetime.

With comparison of the results of the treatment of closed breaks of the bones of the extremities of wartime and breaks of the period of peacetime it is necessary to take into consideration, that in the wartime the breaks frequently were matched other, including bullet damages, that, it is doubtless, weighted coursing and outcomes of treatment of the closed breaks it increased the duration of the stay of casualties in the hospitals.

Closed breaks of shoulder.

Candidate of medical sciences Colonel M. S., Ya. M. Pisarnitskiy.

According to the data of author's development, during the Great Patriotic War the closed breaks of shoulder occurred predominantly in between-battle circumstances (53.80/o), it is thinner/less frequent in combat (35.70/o) and it is still thinner/less frequent on march (10.50/o). The breaks of shoulder, obtained in the between-battle circumstances and on the march, to a considerable degree were connected with the fire with artillery shells, mines and bomb burst.

A number of breaks of right and left shoulder was almost equal.

During the study of the mechanism of the break of shoulder and conditions, under which occurred the break, were acquired following data.

(1) Условия перелома	(2) Процент
(3) Падение от воздушной волны при взрыве снаряда, мины	18.0
(4) Сдавление колесом телеги, пукки, гусеницы танка	7.0
(5) Удар танком, кузовом автомашины	5.6
(6) Автомобильная и мотоциклетная авария	5.0
(7) Авария и неудачная посадка самолета	3.5
(8) Удар винтом самолета	3.5
(9) Удар твердым предметом	14.0
(10) При гранатометании	1.5
(11) Падение на руку	5.6
(12) Рефрактура при падении на большую руку	1.8
(13) Условия и причины неизвестны	2.5

Key: (1). Conditions of break. (2). Percentage. (3). Incidence/drop from air wave during burst of shell, mine. (4). Compression by wheel of cart, gun, track of tank. (5). Strike/shock by tank, by body of motor vehicle. (6). Automobile and motorcycle accident. (7). Accident and unsuccessful landing. (8). Strike/shock by screw/propeller of aircraft. (9). Strike/shock by solid object/subject. (10). With grenade throwing. (11). Incidence/drop on hand. (12). refracture with incidence/drop on injured hand. (13). Conditions and reasons are unknown.

It turned out that it is more than, into 600/o of cases the closed break of shoulder originated from the straight/direct violence: with the strike/shock by solid object/subject, with the collapse of buildings, underground structures, falling of tree/wood, with the contusion by the flying piece of tree/wood, stone and by the located on the end of flight fragment of shell, with the falling by the earth/ground, etc. It is necessary to note that the victims from the fire not in the condition were frequently give the accurate information about the character/nature of trauma and is carried break due to the strike/shock by the fragment of shell, which, apparently did not always correspond to reality.

However, the given relationships/ratios tell about the fact that the majority of the closed breaks of shoulder in military the

circumstances should be related due to the conditions, connected with the use/application of new forms/species of armament (tanks, heavy fast artillery, aviation, motor transport thrust, etc.), with the blast effect of large force, with the incidence/drop on hand, etc.

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In connection with these conditions will cost another special feature/peculiarity of the closed breaks of shoulder in the wartime, namely these breaks were fairly often escorted/tracked by the damage of other organs/controls, thus, for instance, by them into 29.30/o of cases was accompanied the closed trauma of other units of the body and into 7.60/o - simultaneous bullet wound.

According to the form/species the closed breaks of shoulder in war were distributed as follows (in the percentages): cross - 53.1, by sand bar - 18.2, fragmented - 14.0, torsion - 4.2, by separating - 1.4, incomplete - 1.4, it was not explained - 7.7.

The fact calls attention to itself that in contrast to the closed breaks of peacetime with the military predominated the cross breaks. This is doubtless, is closely related in war to the mechanism of the onset of break more frequent from the activity of straight/direct violence, while with the indirect violence appeared

in the majority of cases oblique comminuted fractures and are thinner/less frequent torsion. Thus, for instance, typical on the character/nature and the localization the torsion breaks of shoulder in 2 cases occurred as a result of the sharp muscular stress/voltage with the discoordination of the work of the shoulder muscle-antagonists, who obtained the surprise and unexpected inhibition during the throwing of grenade. In the X-ray photograph in this case was determined typically the skew line of the torsion break, which goes from middle and lower third of diaphysis of shoulder.

The most frequently closed breaks of shoulder bone were localized in middle third of diaphysis (50.40/o), thinner/less frequent - in the lower (26.60/c) and it is still thinner/less frequent in upper third of diaphysis (14.00/o); remaining 9.00/o fall to upper and lower metaphysis of shoulder.

The displacement of broken ends most frequently occurred in width (56.40/o), thinner/less frequent in the combination with other forms/species of displacement (16.80/o), displacement it was not observed into 26.80/o.

A significant number of closed breaks of shoulder (73.4%) occurred in the army area. This determined the type the first therapeutic installation, in which was shown/rendered the first

qualified aid. Thus, from 73.40/o of victims indicated in the army area on DMP entered 47.50/o, and in KhPPG - 25.90/o; remaining 26.60/o with the closed break of shoulder, obtained under conditions of army and front rear, were treated from the very beginning in the army ones (16.00/o) and in the front line (10.60/o) hospitals.

A quantity of passed stages with the closed breaks of shoulder is such: one stage it passed 9.10/o, two stages - 5.70/o, three stages - 35.70/o, four stages - 25.80/o, five stages - 21.00/o, six stages - 2.70/o. Thus, from three to six stages passed 85.20/o of casualties, i.e., the overwhelming majority of patients. This should be explained the absence of conditions for the treatment of this contingent of victims in the army rear. During the treatment beyond the limits of army rear transport immobilization was applied for 12 hours into 23.80/o of cases, for 13-24 hours - into 46.90/o, later than days - into 16.80/o, there is no information into 12.50/o. Therapeutic immobilization was applied for 12 hours into 3.50/o of cases, for 12-24 hours - into 20.30/o, during 2-5 days - into 32.10/o, during 6 days - into 37.80/o and it was not information into 6.30/o of cases.

As basic means for the transport immobilization in all stages within the limits of the hospitals of army served the splint of Cramer (68.50/o), the second place in the frequency occupied plywood

splint (14.40/o) and the third - gypsum cast according to G. I. Turner (9.10/o); the latter was laid usually on DMP, in KhPPG, army evacuation hospital, and into 1.40/o of cases even on PMP. In 8.00/o of cases in KhPPG was superimposed circular gypsum bandage.

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Special treatment began usually in the army evacuation hospital and was finished, in view of the need for prolonged treatment, in the rear.

As the reason for the postponement of therapeutic immobilization could serve the belated identification of break in the stages of evacuation. Thus, for instance, of 11 cases of disagreeing the diagnoses from PMP to the army evacuation hospital in 9 cases the diagnosis of the break was set only in army evacuation hospital and only in 2 cases - in KhPPG. The reason for late therapeutic immobilization in other cases was the late delivery/procurement of victim into the specialized hospital.

The periods of application of gypsum bandage greatly frequently depended on the time of the delivery/procurement of victim into the hospital, on the production of the first radiograms and the refinement of diagnosis.

Sometimes immobilization by gypsum bandage was produced also without the X-ray photograph which was done more lately - through the gypsum bandage or upon its first shift/relief. The reason for this was the large charge of the X-ray room into the period of the mass entry of casualties or the need for the urgent evacuation of casualties and patients.

In essence (92.80/o) for the therapeutic immobilization from the first and to the latter/last days of war was used circular gypsum bandage with the removal/diversion of shoulder, with the short belt/zone, which rarely reached the stop/emphasis to the crests of pelvis; into 7.20/o was used gypsum cast. Circular gypsum bandage was not changed into 42.00/o of cases, it was relieved one time in 37.20/o two times - in 10.40/o more frequent than two times - into 10.40/o of cases. On the average the period of immobilization with the most frequent, cross breaks of diaphysis varied from 46 to 61 days.

The reposition of broken ends with the aid of the traction/extension along the length was produced simultaneously with the application of gypsum dressing. Was done this either by hand or with the aid of the designed at the places of various kinds

devices/appliances for the traction/extension and the retention of broken ends during the application of gypsum dressing.

During the removal/taking of immobilization for the fastest reduction of function extensively was used therapeutic gymnastics, massage and physiotherapy. About 70.00/o of victims with the break of shoulder put to use therapeutic gymnastics in the form of active and passive movements, and also in the form of pulsing on the contractions/abbreviations of muscles. From the physical therapy procedures into 50.00/o of cases was used the massage, into 31.00/o - heat procedures, into 10.00/o - mud cure and into 9.00/o - peat cure.

From the observed nearest complications should be noted into 1.00/o of cases the simultaneous with the damage of other organs/controls the sharply pronounced shock.

Of the later complications, which remained for the prolonged period, more frequent than others were observed paresis and paralyzes of peripheral nerve trunks (8.50/o) moreover more than their half they comprised paresis and paralyzes of radiation/radial nerve.

In 2.80/o of cases was noted the delayed intergrowth of the break of shoulder that usually it was matched with other damages, which inhibited the intergrowth of break and which impeded early

application of circular gypsum bandage. In 1.50/o of cases appeared osteomyelitis after refracture on the soil of the healed bullet break in the same sector.

Clinical outcome up to the moment/torque of extraction from the hospital was determined by the character/nature of anatomical and functional changes. The first were evinced by strains, shortenings and education of dummy joints, the second - in the form of contractures and difficulty of movement.

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The information about the frequency of anatomical changes in dependence on the form/species of break is given in table 260.

With the extraction from the hospital the limitation of movements in the joints was observed into 78.30/o and their distribution was similar: in the shoulder joint the contractures were encountered into 58.70/o, in the cubital - into 26.40/o, simultaneously in both joints - into 6.30/o into 8.60/o of cases localization of contractures was not refined.

The combination of anatomical changes and contractures was observed into 31.20/o of cases with respect to all consequences of

the closed breaks.

Depending on localization of break the average duration of treatment was with the breaks in upper third from 62 to 79 days, on the average - 106 days, in the lower - 104; on the average of 85 days.

Table 260. Frequency of the anatomical outcomes of the closed breaks of shoulder in connection with the form/species of break (in the percentages).

(1) Вид перелома	(2) Исход		
	(3) деформация	(4) укорочение	(5) ложный сустав
(6) Черезбугорковый	0,7	0,7	—
(7) Вколоченный в области хирургической шейки	—	0,7	—
(8) Поперечный	45,4	3,5	0,7
(9) Косой	14,6	1,4	—
(10) Оскольчатый	7,6	—	—
(11) Торсионный	3,5	—	—

Key: (1). Form/species of break. (2). Outcome. (3). strain. (4). shortening. (5). dummy joint. (6). through-tubercle. (7). ~~Packed in~~ *Impacted* in region of surgical neck/journal. (8). ~~Transverse~~ *transverse* ~~oblique~~ *oblique*. (9). ~~By cast bar~~. (10). Fragmented. (11). Torsion.

Closed breaks of the bones of forearm.

Candidate of medical sciences the Lieutenant Colonel of medical service G. L. El'kisek.

In contrast to the breaks of the bones of the forearms of peacetime whose frequency is increased with the offensive of winter period (slippery road), the breaks of the bones of forearm in war most frequently (28.00/o) were encountered into the autumnal months

(September, October, November), and then decreased in winter, spring and summer months.

As is known, the closed breaks of the bones of forearm under conditions of peacetime more frequently are caused by indirect violence than by the straight line, which operate directly on the bone. On the contrary, in war the closed breaks of forearm more frequent were caused by straight/direct violence.

The mechanism of the break of the bones of forearm in connection with conditions and facts, under which it was obtained, based on materials of author's development, is the following.

(1) Механизм перелома костей предплечья	(2) Процент
(3) Ушиб твердым предметом (вторичным снарядом, осколком и др.)	48
(4) Падение от воздушной волны	14
(5) Авария автомашины, танка и попадание в них снарядов и мин	12
(6) Засыпание землей	10
(7) Отдача пушки при выстреле	2
(8) Падение с высоты	3
(9) Обратная отдача ручки мотора машины	2
(10) Ушиб на работе	1
(11) Удар винтом самолета	1
(12) Не уточнено	7

Key: (1). Mechanism of the break of the bones of forearm. (2). Percentage. (3). Contusion by solid object/sub. (secondary shell, fragment, etc.). (4). Incidence/drop from air wave. (5). Accident of motor vehicle, tank and incidence/impingement in them of shells and mines. (6). Filling by earth/ground. (7). Recoil of gun with shot. (8). Incidence/drop from height. (9). Reverse recoil of knob/arm/handle of motor of vehicle. (10). Contusion on work. (11).

strike/shock by screw/propeller of aircraft. (12). it is not refined.

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The cases where the breaks occurred from the direct impact, compose 74.00/o. Indirect breaks composed 26.00/o and were obtained mainly with the incidence/drop on the elongated hand as a result of the jerk/impulse by air wave during the bursts, with the incidence/drop from the height, with the reverse recoil the knobs/arms/handles of motor vehicle or tank (without the direct impact by knob/arm/handle).

The isolated/insulated breaks of radiation/radial bone composed 55.00/o, of them 20.00/o arrived to the breaks in the classical place, i.e., in the area of metaphysis of the extremital end of the radiation/radial bone. The large part of the breaks of radiation/radial bone in the classical place must be considered the indirect breaks, which arose with the incidence/drop from the height or from the action of air wave on the advanced forward palm (protective reflector movement). The diaphysic isolated/insulated fractures of radiation/radial bone were encountered in lower third into 20.00/o, in middle third - into 13.00/o, in upper third - into 2.00/o.

The isolated/insulated breaks of the ulna are discovered into 20.00/o; in this case the first place in the frequency occupy middle third (10.00/o), the second place - upper third (6.00/o) and the third place - lower third (4.00/o).

Among breaks of both bones of forearm (25.00/o) a great number falls to the average third (11.00/o) smaller - to lower third (6.00/o) and even more smaller - to upper third (1.00/o). Simultaneous breaks at different levels were noted into 7.00/o of cases.

The bones of right forearm were damaged into 45.00/o, left - in 54.00/o, both forearms - into 1.00/o of cases.

Table 261 shows the distribution of patients with the closed break of the bones of forearm according to the character/nature of break.

Consequently, among the breaks of all bones considerably prevail cross.

The analysis of the character/nature of the displacement of broken ends established that into 15.00/o of cases of no displacement it was, moreover into 9.00/o were observed the breaks of

radiation/radial bone, predominantly in the typical place as compression.

Most frequent was the displacement of broken ends in the width, which composed 50.00/o, of them it was 32.00/o of isolated breaks of radiation/radial bone and 13.00/o of breaks of both bones of forearm. The angular displacements of broken ends occurred into 13.00/o, displacement along the length - into 6.00/o. In 31.00/o of cases was observed the combined displacement of broken ends (displacement into the width, into the length, also, at angle). Prevailed the combination of displacement in the width and at the angle, opened to the volar side. In 31.00/o of all cases of the break the character/nature of the displacement of broken ends is not established/installed.

Table 261. Distribution of patients with the closed break of the bones of forearm according to the character/nature of break (in the percentages) .

(1) Кость	(2) Перелом			(6) Итого
	(3) Попереч- ный	(4) Носов	(5) Осколь- чатый	
(7) Лучевая	72,0	13,0	15,0	100,0
(8) Локтевая	50,0	25,0	25,0	100,0
(9) Обе кости	71,0	14,5	14,5	100,0
(10) В среднем	63,0	15,5	16,5	100,0

Key: (1) . Bone. (2) . Break. (3) . cross. (4) . by sand bar. (5) . fragmented. (6) . Altogether. (7) . Radiation/radial. (8) . Cubital. (9) . Both bones. (10) . On the average.

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The breaks of the bones of forearm into 29.0o/o of cases accompanied the damages of other units of the body: in 8.0o/o bullet wound and into 21.0o/o closed trauma of other units of the body. Among the accompanying closed trauma they were noted into 6.0o/o breaks and heavy contusions of upper extremities, into 5.0o/o - damages of other units of the body, into 3.0o/o - general/common/total air contusion; into remaining 7.0o/o there were damages of lower extremities and spine.

The diagnosis of the isolated/insulated breaks of the bones of forearm without the aid of the X-ray photograph in many instances was difficult, especially in conditions of the foremost stages of the evacuation where tactical situation forced to pay main attention heavily to casualties. The clinical signs, serving as reference point for diagnosing the break of the bones of forearm, were the same as and in conditions of peacetime: it was indicated the presence of the local restricted swelling, localized pain at a pressure on the bone, the strain of forearm, pathological mobility for the elongation/extent of forearm and violation of function. Most frequently was encountered the combination of the signs: the strain, localized pain at a pressure on the bone, the restricted swelling and the violation of function. More rarely was noted the crunch of the broken ends of bones. Diagnosis was more precisely formulated by X-ray photograph, usually in two projections. According to the data of author's development, X-ray photograph they were produced in the hospitals: in the rear ones - into 33.00/o, in the front line ones - into 28.00/o, in the army ones - into 10.00/o, in KhPPG - into 3.00/o; into the remaining 24.00/o treatments of the breaks of the bones of forearm it was finished without the x-ray examination, and into 2.00/ of cases it remained unexplained, was it produced. They were frequently limited to one roentgenoscopy of break.

Treatment. We give the distribution of victims according to a

number of those passed with them stages (in the percentages): through one stage it passed 4.0, through two stages - 11.0, through three stages - 30.0, through four stages - 32.0, through five stages - 16.0 and through six and more than stages - 7.0.

The majority of the victims (62.00/o) passed three or four stages; 66.00/o of victims began treatment on DMP, 14.50/o - in KhPPG, 5.00/o - in the army evacuation hospitals, 6.50/o - in the front line evacuation hospitals, 2.50/o - in the rear hospitals, 0.50/o - in GLR and 5.00/o - in the unknown stage. Front line and rear hospitals were usually the first therapeutic installation only in such a case, when break occurred in the area of their disposition.

Is very important for explaining the quality of treatment the study of procedure and periods of setting of breaks. From existing into 14.00/o knowledges in regard to this it is known that the reposition of broken ends into 8.00/o was produced during the first 3 days, and in remaining 6.00/o - during 3 weeks. Was produced reposition in different stages of evacuation, beginning with DMP (2.00/o) and finishing with the rear hospitals (2.50/o). under the local anesthesia the reposition is produced into 7.00/o of cases, under narcosis - into 3.00/o, in the remaining cases without the anesthetization.

That produced in three injured/damaged bloody reposition in two led to the positive results.

The position/situation, which with the immobilization was added to forearm, with rare exception, in the medical documents was not noted.

Transport immobilization is produced into 65.00/o of cases during the first day, into 10.00/c - during second- fifth day and into 1.00/o - during sixth- tenth day. In 17.00/o time of immobilization not indicated and into 7.00/o immobilization it was not produced.

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For the temporary/time immobilization more frequently was used the splint of Cramer (34.00/o), thinner/less frequent - plywood (13.00/o) and gypsum cast (5.00/o) and most rarely - cross-linked (4.00/o). In 44.00/o of cases it was not indicated, what form/species of immobilization was applied. The large part of these splints was laid on DMP, lesser part - on PMP.

The therapeutic immobilization of break in victims was produced during the first day into 9.00/c, in time from 2 to 5 days - into

45.00/o. By remaining victim therapeutic immobilization is produced within the later periods: from 6 to 10 days - into 20.00/o and from 11 to 30 days - into 17.00/o. In 8.00/o of cases the time of therapeutic immobilization is unknown and 1.00/o of victims it finished treatment in the temporary/time bandage.

As the therapeutic immobilization bandage into 66.00/o of cases served circular gypsum bandage, into 28.00/o of cases - cast, into 2.00/o - splint of Cramer and into 4.00/o form/species of immobilization it was not indicated.

Circular gypsum bandage captured forearm and hand to the heads of mesopodial bones, leaving fingers/pins by free ones for the exercises, and it achieved middle or upper third of shoulder. Gypsum casts in all cases were laid from the back side.

The large part of the circular and longette gypsum bandages was laid in front line hospitals (37.00/o).

Should be noted as the positive fact that the immobilization without the necessity was not disturbed. In 90.00/o of cases gypsum bandage or cast during entire period of treatment was changed only one time or in no way was changed. And only into 10.00/o of cases it was changed two times.

Physiotherapy and therapeutic gymnastics were conducted in essence in the front line ones and in the rear hospitals. To one therapeutic gymnastics without the use/application of physiotherapy they were restricted into 22.00/o of cases. On the contrary, to one physiotherapy the subsequent treatment was restricted into 8.00/o. The large part of the victims (70.00/o) put to use both methods. From the physical therapy procedures most frequently (in 57.00/o of all cases) was used the massage, into 36.00/o - warm manual baths; in remaining 7.00/o of cases was used by mud/contamination, paraffin, peat, clay treatment, ergotherapy and electrotherapy. Therapeutic gymnastic exercises were used in essence after the removal/taking of the gypsum bandage when doctors revealed, as a rule, the contracture of joints, that it could not but be reflected in the duration of treatment. The active exercises of fingers/pins and shoulder joint during the immobilizations, which have high value for warning/preventing the contractures, were produced unsystematically and insufficiently persistently.

Early complications were encountered into 9.00/o of cases. Their large part (7.00/o) they composed the damage of nerves, mainly radiation/radial (5.00/o) it is isolated/insulated or in combination with the damage/defeat of other nerves. Into a number of more rare

complications entered surface phlegmons on the spot of break and dislocation of the head of radiation/radial bone with the break of the ulna in upper third (Monteggia's fracture).

Paralyses toward the end of the treatment disappeared, with exception 3.00/o cases in which they remained also with the extraction of patients.

Late complications in the form of difficulty of movement and contracture of radiocarpal and elbow joint occurred into 75.00/o of cases, moreover only 14.00/o of this number were discharged from hospital completely cured. In 3.00/o of cases was observed the delayed consolidation of break, which required prolonged treatment.

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Immobilization during 4-8 weeks was observed in half of all cases. Almost quarter of breaks were consolidated during the periods up to 4 weeks.

The calculated on the basis of the duration of immobilization average period of consolidation of the closed breaks of the bones of forearm is equal to 7 weeks, i.e., 49 to days. On the average for the treatment of victim, counting from the day of break to the day of

extraction from the hospital, were required 79 days. The difference during 30 days composes the average period, during which was conducted the treatment of contractures. In 42.00/o of cases remained the more or less expressed and clinically clearly determined strain of the bones of forearm. Full/total/complete anatomical reduction it was possible to attain most frequently with the isolated/insulated break of radiation/radial (33.00/c) and ulna (14.00/o). Most rarely anatomical reduction was observed with break of both bones (8.00/o). On the contrary, strain remained most frequently after break of both bones (14.00/o, i.e., more than in half of all cases of break of both bones). All dummy joints (3.00/c) appeared as a result.

Similar pattern presented functional outcomes. in 61.00/o of cases remained the more or less expressed resistive contractures of one or the other joints of forearm and hand, also, into 3.00/o - stable paralyses. Full/total/complete functional reduction is achieved most frequently with the isolated breaks of radiation/radial bone (into 22.00/o); whereas breaks of both bones most rarely gave functional reduction (6.00/o), contractures accompanied most frequently breaks of both bones (18.00/o, i.e., it is more than 2/3 all cases of break of both bones).

Thus, during the treatment of the closed breaks of the bones of forearm in the Great Patriotic War occurred following, although

caused by special features/peculiarities circumstances, nevertheless the unfavorably reflected in treatment shortages: in quarter of cases it was not almost produced x-ray examination. Frequently it consisted only in roentgenoscopy that it could lead to the diagnostic errors. Frequently x-ray examination was produced with delay. In many instances they were limited to single research and they did not conduct the X-ray test of treatment. More than in half of cases (57.10/o) the reposition of broken ends was conducted during the first 3 days in the moment/torque of break; into 17.00/o of cases the therapeutic immobilization of forearm was also late (from 11 to 30 days). Frequently (into 9.00/o of cases) extremity was immobilized for the insufficient for the consolidation period (2-3 weeks). On termination of immobilization into 22.00/o of cases the victims did not use physiotherapy. In these cases they were limited to some exercises, what was insufficient for the rapid correction of contracture - the ordinary satellite of the breaks of the bones of forearm. In the unit of the cases methodic baking interfered with the evacuation (55.00/o of casualties passed four and more than stages).

However, if we consider the difficulties, which appeared during the treatment of breaks in war, then it will become doubtless, that for reducing the health of victims was applied the maximum efforts/forces.

Closed breaks of thigh.

Doctor of medical sciences the Colonel of medical service G. A. Garibdzhanyan.

Closed fractures of thigh are the heavy damage of skeleton, which are reflected in entire condition of organism. They require prolonged treatment, they for a long time deprive the patient of ability to work and are frequently translated him into invalids' rank.

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However, in peacetime in the treatment of these breaks in the special traumatological installations were achieved great successes. Thus, for instance, S. Ye. Kashkarcv (1937) on the material of Traumatological institute im. R. B. Vreden notes that the favorable results were obtained into 97.0c/o of cases.

Is much more complex than under peaceful conditions, the treatment of the closed breaks of thigh in war. The series/number of unfavorable conditions as, for example, the forced stage treatment, the need of the prolonged stay of patients in the transport splints, belated roentgenologically supervision, etc., impedes and complicates

the treatment of these breaks.

Literature on this question both Soviet, and is foreign, it is very small: it was possible to find only some interrupted/fragmentary information.

M. L. Oleynikova (1916) among 67 cases of the bullet break of thigh mentions about 5 cases of non-bullet break of thigh. The author she recommended to treat these breaks by adhesive traction/extension during 3-4 weeks, after which to put gypsum bandage.

Relative to 5 victims with the closed break of the thigh of wartime, treated by operational method, in the literature are S. Ye. Kashkarov's references (1943). The author examined these breaks together with other 35 breaks of thigh, treated operationally.

On several breaks of thigh in the wartime, but without the reduction of factual material, is mentioned in G. S. Bohm (1943). According to him, all patients, who obtained such breaks, should be immediately evacuated into the rear. He considered that during the treatment of the closed breaks of thigh the deaf gypsum bandage must be used only not the time of transport and that the hospital method of treatment must be skeletal/skeleton traction/extension.

G. A. Vasil'yev gives 13 cases of the closed break of thigh, observed in the army air hospital, moreover for the treatment of the diaphysic fractures of thigh it was required on the average of 117.2 days. In all probability, this hospital was located under particularly favorable conditions, since it is more than half of casualties after catching in it during the day of trauma, it remained there to the recovery. By this only it is possible to explain the exclusively favorable result of treatment, since of 124 injured/damaged with the break different bones only two proved to be unfit to the military service and one it is restricted by suitable.

For the basis of the study of a question about the treatment of the closed breaks of thigh under conditions of the Great Patriotic War is undertaken the analysis of the author's development of the histories of disease/illness.

The majorities of the breaks of thigh on the stench, as in the peaceful circumstances, it fell to middle third (51.00/o); this, possibly, it is caused by anatomical-physiological factor, namely by the greatest bending of femur in middle third and by the presence here of significant size of foramina nutritia, and even in the greater measure - by factor of trauma, since in war in the pathogenesis of the closed breaks straight/direct trauma prevailed above the indirect.

The cross breaks of thigh in war in the frequency occupied first place (38.00/o) which coincides with the data about the closed breaks of thigh in the peaceful circumstances. By the significant severity of trauma under conditions of war is explained the high percentage of comminuted fractures (20.0), sometimes with the strong crushing of diaphysis for the large elongation/extent.

We give facts, with which occurred the closed breaks of thigh in war.

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(3)	(1) Причины перелома	(2) Процент
(3)	При ударе твердым предметом во время артиллерийского обстрела и бомбардировки	41,5
(4)	При засыпании землей	7,5
(5)	Травма боевыми машинами	17,5
(6)	При падении во время ранения	2,0
(7)	При падении от взрывной волны	1,0
(8)	При воздушной катастрофе	4,0
(9)	При невыясненных обстоятельствах	6,5

Key: (1). Reasons for break. (2). Percentage. (3). With strike/shock by solid object/subject during shelling and bombing. (4). With filling by earth/ground. (5). Trauma by combat vehicles. (6). With incidence/drop during wound. (7). With incidence/drop from blast. (8). With air catastrophe. (9). Under unexplained facts.

Thus, the significant part of the breaks of thigh is caused by trauma by combat vehicles, gap of aircraft bombs, shells and mines, in this case by the reason for break was the strike/shock fragment or by the dud on the end of flight where piercing power already ran low, but remained the still striking power of the falling/incident heavy object/subject.

During the analysis of the mechanism of break it is necessary, of course, schematically, to the straight/direct trauma to relate the

strike/shock by solid object/subject and trauma by combat vehicles (only 59.00/o).

The diagnosis of the breaks of the diaphysis of thigh in the foremost stages of evacuation did not present difficulties, if we do not take into consideration of the identification of the character/nature of the break, standing of broken ends and disposition of bone fragments. From this point of view early x-ray examination had high value; however, more than half of roentgenological inspections/examinations was carried out in the evacuation hospitals, i.e., within the later periods.

Transport immobilization. Timely and technically correct immobilization greatly frequently determined clinical coursing and outcome of the breaks of thigh.

Primary transport immobilization with the closed breaks of thigh was realized in the majority of the cases during the first day and only in certain cases after the days.

In 2/3 patients with the closed break of thigh was produced transport immobilization by the splints of Diedrich, Thomas-Vinogradov and by gypsum bandage, while in remaining - by other splints.

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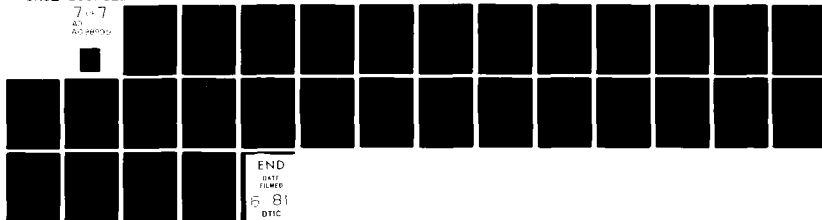
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Gypsum bandage was the most convenient method of immobilization under conditions of stage treatment, since it, providing full/total/complete rest and immobility of bone broken ends and holding them in the correct position, necessary for the fastest coalescence of break, made it possible to at the same time evacuate casualties into the deep rear of the country. More than half of all casualties with the closed break of thigh finished treatment in those gypsum bandages which were by it superimposed in the army and front line hospitals.

In 11.50/o of cases gypsum bandage preceded the skeletal/skeleton traction/extension, used in the front line evacuation hospitals when by one-time traction/extension it was impossible to place the broken ends of bone in the correct position.

In 22.50/o of cases after immobilization by the gypsum bandage, superimposed in the front line area, in the rear hospitals as a result of the unsatisfactory position/situation of broken ends was used skeletal/skeleton traction/extension. The average duration of therapeutic immobilization with the closed breaks of thigh was 74 days.

The damage of nerves was observed into 4.0o/o: the sciatic nerve into 1.5o/o, femoral - into 1.0c/o, fibular - into 1.0o/o and tibial - into 0.5o/o.

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37.0o/o Of victims, together with the closed break of thigh, had closed trauma and the wounds of other departments of body. In 5.5o/o of cases the closed break of thigh was complicated by shock.

In 19.0o/o of cases within the later periods were noted the complications from the side of internal organs/controls, somehow: pneumonia, enterocolitis, etc. Shock, the combined trauma and late complications considerably burdened the condition of patients with the closed break of thigh; in regard to this was produced the transfusion of blood 14.0c/o of all patients with the break of thigh.

Reposition of broken ends. The success of the treatment of breaks generally and the breaks of thigh in particular depended on two basic reasons: from the timely and correct reposition of broken ends and good immobilization of extremity. For the first time reposition of broken ends they began to realize on a mass scale in the Great Patriotic War because of the widespread introduction of orthopedic tables and apparatuses for the traction/extension in the

evacuation hospitals and even in KhEPG.

The methods of setting of broken ends varied depending on the level of break.

With the breaks of thigh in upper third central broken end under the effect of the contraction/abbreviation of an iliac-lumbar and buttock muscles is bent, is deviated and will be rotated outside; therefore with setting of broken ends to foot added position/situation removals/diversions and flexing with respect to the position/situation of central broken end.

With the breaks of thigh on the average third bringing muscles pull peripheral broken end to the center line (danger of damage in femoral artery in the region Guterov's canal); in these cases, besides the traction/extension along the axis, frequently appeared the need in the lateral thrust.

With the breaks of thigh in lower third peripheral broken end under the effect of the gastrocnemius muscle is displaced back/ago (danger of the damage of neurovascular bundle in the popliteal region); for the weakening of gastrocnemius muscle the traction/extension was conducted with the bent knee joint.

In 80.00/o of cases of the closed break of thigh in war occurred the displacement of the broken ends: into 30.00/o along the length, into 10.00/o in the width, into 2.50/o at angle, into 2.50/o on the periphery; the combined displacement of broken ends was observed into 35.00/o.

In 35.00/o of cases is produced early setting of broken ends by greater unit under the local anesthesia. Frequently attempts at setting of broken ends were produced only in the rear hospitals, moreover within the sufficiently late periods. As a result, as it will be indicated below, in certain cases the shortening of thigh exceeded 5 cm.

Among a large quantity of bullet wounds, which required from the vital readings/indications to urgent operational aid, with the closed breaks of thigh in the army area was necessary only satisfactory transport immobilization without setting of broken ends. Basic aid during these damages was rendered into specialized front line hospitals, where casualty they delivered usually toward the end of the first week, but within this time scraps managed partially to be fixed/recorded in the incorrect position/situation. In order to set them in the correct position, it was necessary to use skeletal/skeleton traction/extensior by cargo from 10 to 15 kg. One-time traction/extensior in these cases did not frequently give

desirable results. Skeletal/skeleton traction/extension it underwent in all stages, including rear hospitals, 34.0c/o of the patients, who obtained the closed break of thigh. This small numeral to a considerable degree is explained by the high maneuverability of the field hospitals during the Great Patriotic War and by the need for evacuating these patients into the deep rear.

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Bloody reposition. In view of the large displacement of broken ends into 8.0c/o occurred the attempts to set broken ends operationally. This in the majority of the cases related to the breaks in middle third. With them in half of the cases in the foremost stages was made the attempt set broken ends bloodlessly. X-ray examination in these patients was produced in the front line ones or in the rear hospitals. Of the operations/processes of bloody setting in the majority of the cases of distance good and satisfactory results and only in the unitary cases remained the shortening of extremity more than on 5 cm and was formed dummy joint and contracture.

In the treatment of the closed breaks of thigh, as all breaks of the bones of extremities, the most important role plays therapeutic physical training. To this measure during the Great Patriotic War was

attached very serious value, which can be judged from that fact that with all closed breaks only into 7.00/o of cases could not note the uses/applications of the therapeutic exercise. However, the education of resistive contractures toward the end of the treatment more than in half of the cases of the closed breaks of thigh speaks for the fact that the therapeutic gymnastics during these damages was used, apparently insufficiently consecutively/serially and persistently.

The overwhelming majority of casualties with the closed break of thigh (90.00/o) finished treatment in the rear hospitals.

The duration of the stationary treatment of patients with the closed break of thigh was following: 3 months were found in hospital 11.50/o of casualties, 4 months - 25.00/o, 5 months - 43.50/o, 6 and more than months - 16.50/o; the period of the stay in the hospital was not established/installed into 3.50/o of cases.

As can be seen from given data 4/5 all suffered with the closed break of thigh, obtained in war, required treatments from 3 to 6 months. Average period treatments were 142 days.

Since soldiers were situated in the hospital to completion of treatment, then these periods approach periods of disablement with the breaks of thigh in the peaceful circumstances.

At the moment of extraction from the hospital in 80.00/o of victims the break of thigh completely grew together itself, in 6.00/o was formed unhealed callus and in 1.50/o of intergrowth of broken ends it did not advance, in 12.50/o outcome not known.

The closed breaks of thigh, as is known, they can be finished with a significant number of strains among which the shortening occupies visible place. On the degree of shortening depends the violation of statics of victim and the functional possibilities of the damaged lower extremity. Therefore the sizes/dimensions of shortening are basic standard/criterion with the estimate of the quality of therapeutic aid.

With the closed breaks of thigh in war were observed the shortenings in the following limits: shortenings was not in 10.50/o, shortening to 1 cm was in 2.50/o, shortening in 2 cm - in 14.50/o, shortening in 3 cm - in 13.50/o, shortening in 4-5 cm - in 32.00/o, shortening in 6-10 cm - in 13.00/o unknown into 14.00/o of cases.

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Hence it follows that during the treatment of the closed breaks

of thigh were observed the shortenings more significant in war, than in the peaceful circumstances, that can be explained by both the greater severity of the military closed breaks and by difficulty of the conditions of the treatment of the breaks and, in particular, by the impossibility to extensively use under conditions of stage treatment skeletal/skeleton traction/extension.

Closed breaks of the bones of shin.

Doctor of medical sciences the Lieutenant Colonel of medical service
A. A. Nikitin.

The literature data about the treatment of the closed breaks of the bones of shin in the preceding wars there is not.

On the statisticians of important Soviet traumatological institutes, the closed breaks of the bones of shin under conditions of peacetime occupy in the frequency the second place among the breaks of tubular bones, comprising on the average of approximately 18.00/o. Almost half of all breaks of the bones of shin falls to the breaks in the region of the ankles/malleoli. Among the diaphysic fractures of the bones of shin in the first place in the frequency will cost breaks of both bones, on the second - the isolated/insulated break of tibial and on the third - fibular bone.

Based on materials of author's development, among the closed breaks of the bones of shin in the Great Patriotic War the breaks of the bones of right shin composed 54.0o/o, and by left - 46.0c/o.

The overwhelming majority of the closed breaks of the bones of shin (77.0o/o) was obtained with the execution of the combat assignments; remaining 23.0o/c - on the march and on the work in the units.

Certain increase in the frequency of breaks was noted in winter and spring months. One should, however, note that the frequency of the closed breaks of the bones of shin in war depended mainly on rate of work at the front (preparation for the combat operation/process, operation/process itself).

The relation of the break of the bones of shin with the conditions, under which it occurred, was represented in the following report/summary.

(3)	(1) Механизм переломов	(2) Процент
	Удар твердым предметом во время артиллерийского обстрела и бомбардировки с воздуха	56.0
(4)	Падение от взрывной волны	21.0
(5)	Обвал блядажа от попадания артиллерийского снаряда	3.5
(6)	При аварии на автотранспорте	4.5
(7)	Наезд гусеницей и колесом пушки	4.0
(8)	Падение с лошади	2.5
(9)	Падение на неровной местности во время перебежек	1.5
(10)	При аварии самолета	2.0
(11)	При приземлении на парашюте	0.5
(12)	Не выяснено	2.5

Key: (1). Mechanism of breaks. (2). Percentage. (3). Strike/shock by solid object/subject during shelling and bombing from air. (4). Incidence/drop from blast. (5). Collapse of dugout from incidence/impingement of artillery shell. (6). With accident on motor transport. (7). Visit by track and by wheel of gun. (8). Incidence/drop from horse. (9). Incidence/drop in uneven locality during rushes. (10). With accident of aircraft. (11). With landing by parachute. (12). it is not explained.

Should be noted an insignificant number of cases of the closed breaks of the bones of shin during the inversion with the combat weaponry and a significant percentage of these breaks with the incidence/drop from the blast. But among the reasons, leading to the closed break of the bones of shin in war, was most frequently observed direct strike/shock on the shin by the solid object/subject: by calculus/stone, lump of the earth/ground, by piece of wood, the rest during shelling and bombing. About half of these cases it is

documented as the break as a result of direct impact by the fragment of shell.

The diagnosis of the closed breaks of the bones of shin in war was established/installed in the foremost stages and consistently was more precisely formulated in proportion to evacuation into the rear. On the basis of some clinical symptoms alone, with small exception, the diagnosis was established/installed in PMP and BMP.

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The disagreements of the diagnoses, set on PMP and BMP, composed about 10.00/o in BMP and subsequent stages - 2.50/o and they related mainly to the breaks of the fibular bone and malleolus, which, as is known, and under conditions of peacetime present the greatest difficulties for the diagnosis and usually are more precisely formulated with the aid of the X-ray photograph. For these purposes with the breaks of the bones of shin roentgenography was used in KhPPG into 7.00/o and in the army evacuation hospitals into 27.00/o. In all remaining cases the X-ray photographs were made in the front line and rear evacuation hospitals, besides those cases (8.00/o) when the stage of the production of roentgenography not the rear was refined.

The characteristic of the closed breaks of the bones of shin in war is indicated in table 262.

Thus, the overwhelming majority of the closed breaks of the bones of shin (47.50/o) relates to breaks of both bones of shin; in the second place will come the isolated/insulated breaks of tibia (37.50/o), also, on the latter - fibular (15.00/o).

Only 2.50/o of closed breaks of the bones of shin were observed in upper third; large part (70.50/o) of the breaks of the bones of shin was into middle third and 27.00/o of breaks they fell to lower third. As is known, and under conditions of peacetime the overwhelming majority of the diaphyseal fractures of the bones of shin occurs in its lower half. This is explained by the thinness of the cortical layer in lower half of the tibia, which easily yields to violence.

The cross breaks of the bones of shin originated from the surprise violence, which operates in the transverse direction; in this case both bones of shin are broken almost on the same level. If cross violence performs from the front back/ago, then comes the turning point of the bones of shin at the angle, opened forward, and, on the contrary, when violence performs from behind in advance, comes turning point with the displacement of fragments at the angle, opened

back/ago.

Oblique breaks are obligated to the mechanism of flexing. Turning point comes with the bend of shin, when its one end is fixed/recorded, and on other performs violence. Fibular bone, continuing the line of the break of the tibia, usually breaks somewhat above.

Comminuted fractures of both bones of shin attacked/advanced from the straight/direct violence most frequently in middle third.

Table 262. Form/species of the closed breaks of the individual bones of shin (in the percentages).

(1) Вид перелома	(2) Кость			(6) Всего
	(3) обе кости голени	(4) большая берцовая	(5) малоберцовая	
(7) Поперечный	16,5	12,0	2,0	30,5
(8) Косой	12,5	15,0	6,0	33,5
(9) Оскольчатый	14,0	3,0	—	17,0
(10) Торсионный	2,0	—	—	2,0
(11) Лодыжечный	2,5	7,5	7,0	17,0
(12) Всего	47,5	37,5	15,0	100,0

Key: (1). Form/species of break. (2). Bone. (3) both bones of shin. (4) is tibial. (5) is fibular. (6). In all. (7). Cross. (8). By sand bar. (9). Fragmented. (10). torsion. (11). malleolar. (12). In all.

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Torsion (screw-shaped) breaks of both bones of shin were the result of the combination of the activity of load with the sharp rotation of shin inward or outside with the fixed/recorded foot. In the first case, i.e., during the rotation of shin inward, was obtained screw-shaped break with the line of break, which goes from below and from within upward and outside, in this case central fragment was displaced forward and outside, and extremity back/ago and inward, opening/disclosing the bearing/angle of fragments back/ago. Fibular bone usually broke above under its head, which

frequently caused the damage of fibular nerve.

Malleolar breaks composed altogether only 17.00/o; in the majority of the cases they originated from the indirect violence: with the incidence/drop from the height or the tightening stops. The isolated/insulated break of external malleolus appeared under the surprise effect of force on of supinated foot. Lateral heel-fibular ligament was strained and was broken away external malleolus. Under further effect of force the medial surface of collision bone, being abutted against internal malleolus, broke it usually at the level of joint, as a result was obtained break of both the ankles/malleoli.

The isolated/insulated turning point of internal malleolus came under the surprise effect of force on pronated foot. Strong/durable deltoid ligament rarely is torn, it more frequently breaks away internal malleolus at the level of joint. If the activity of the force, pronating the foot, it is continued, then collision bone leans by the external surface into the end of the fibular bone, which breaks from the bend in the thirnest place, on 4-6 cm higher than ankle/malleolus. This compound fracture of the ankles/malleoli with disuniting tibiofibular large unit/formation is the heavier (Dupuytren's break).

The complications, connected directly with the break of the

bones of shin, were scarce: into 1.50/o was observed the damage of tibial nerve, into 2.00/o - fibular nerve and into 0.50/o - tibial artery. Such complications as shock, gangrene, oil embolism, with the closed breaks of the bones of shin it was not, just as amputations and the fatal results.

The combined trauma with the closed breaks of the bones of shin is characterized into by 6.00/o cases of contusion (contusions) and into by 2.00/o presence of another break.

The simultaneous bullet wound of soft tissues in patients with the closed break of the bones of shin is noted into 10.00/o, of them into 3.00/o occurred the wound of upper extremities, also, into 7.00/o - lower.

The imposition of primary transport immobilization in the first hour was produced into 20.00/o, for 2-3 hours - into 32.50/o, for 4-6 hours - into 31.50/o, for 7-24 hours - into 11.00/o, it is not established/installed into 5.00/o.

The substances of transport immobilization with the breaks of the bones of shin they were: into 56.00/o wire splint, into 5.00/o - splint of Diedrich, into 16.00/o - splint Thomas - Vinogradov, into 8.00/o - gypsum splint; the type of splint was not

established/installed into 15.0o/o.

The imposition of therapeutic immobilization with the closed breaks of the bones of shin to 5 days was observed into 52.0o/o of cases, from 6 to 10 days - into 30.0o/o, 11 days and later - into 18.0o/o.

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As the therapeutic immobilization during the treatment of the closed breaks of the bones of shin into 94.0o/o was used circular and into 6.0o/o longette gypsum bandage. The complications, connected with the use/application of a gypsum bandage, it was not observed. With breaks of both bones of shin, and also with the isolated/insulated break of the tibia circular gypsum bandage was laid to half of thigh with the bent at angle of 140-150° knee joint and with the light bottom flexing in the talocrural joint. With the isolated/insulated breaks of fibular bone and ankle gypsum bandage was laid to the knee joint; into 6.0o/o of these breaks was applied lateral gypsum cast in the form of stirrup according to N. M. Volkovich.

If a question about the immobilization was solved in favor of gypsum bandage, then somewhat differently proceeded affair concerning

second moment/torque of the treatment of the closed breaks of the bones of shin - by reposition of fragments. One-time manual reposition with the application of gypsum dressing did not always give the possibility to remove the frequent with breaks of both bones of shin displacement of fragments along the length. The use/application of skeletal/skeleton traction/extension during the sharp, not yielding to reposition displacement of broken ends was difficult in the foremost stages of evacuation, but had the place in rear evacuation hospitals (2.00/o), without achieving, however, its target as a result of the passed periods. The lateral displacements were amended by the application of gypsum dressing, but the absence of control X-ray photograph did not give the possibility to in proper time correct the standing of fragments. ~~As~~^{As} it is known, even small changes in the axis of extremity unavoidably lead to the static violations with all resultant consequences.

Important fact both for the healing of fracture and prophylaxis of the contractures of large joints were the early active movements of extremities whereas realized which it was to be from the first days of the application of gypsum dressing. For this purpose to patient they suggested, that it should be trained/aged in the pulsing on the muscle contraction and on the minus active movements not only in the fingers/pins, but also in the large joints, which is completely possible in the gypsum bandage. Therapeutic walking for

exciting the trophic system of bone after reposition and immobilizations patients began as early as possible with the gradually amplifying load on the damaged extremity. To this was focused attention as to the essential moment/torque, which facilitates the consolidation of break, and also to prophylaxis of contractures.

Table 263. Average duration of immobilization and the average duration of hospital treatment with the closed breaks of the bones of shin (in the percentages).

(1) Вид перелома отдельных костей голени	(2) Среднее число дней	
	(3) иммобили- зации	(4) госпиталь- ного лечения
(5)		
(6) Переломы диафиза		
Поперечный:		
(7) обеих костей	93,2	126,9
(8) большеберцовой кости	75,4	114,7
(9) малоберцовой кости	37,5	62,5
(10) Косой:		
(7) обеих костей	80,4	119,9
(8) большеберцовой кости	72,3	106,4
(9) малоберцовой кости	62,4	75,0
(11) Оскольчатый:		
(7) обеих костей	103,0	146,0
(8) большеберцовой кости	91,8	127,5
(12) Торсионный:		
(7) обеих костей	73,0	95,0
(13) Переломы лодыжек		
(14) Наружной	39,4	69,3
(15) Внутренней	47,6	78,9
(16) Обеих лодыжек	50,0	146,0

Key: (1). Form/species of the break of the individual bones of shin. (2). Average number of days. (3) immobilization. (4) hospital treatment. (5). Breaks of diaphysis. (6). Cross. (7) both bones. (8) the tibia. (9) fibular bone. (10). By sand bar. (11). Fragmented. (12). Torsion. (13). Breaks of ankles/malleoli. (14). External. (15). Internal. (16). Both ankles/malleoli.

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In the front line area these methods of treatment were used

especially widely (78.0o/o).

The blood transfusion by patient with the closed break of the bones of shin is applied altogether only into 3.0o/o in the rear evacuation hospitals within the late periods of treatment.

Periods of the duration of immobilization and average quantity of days, carried out in the therapeutic installations by patients with the closed break of the bores of shin, obtained in war, are represented in table 263.

For the comparison is cited the information about the periods of disablement with the breaks of the bones of shin under the peaceful conditions (table 264).

The periods of the reduction of ability to work under conditions of peacetime and the periods of the reduction of fighting efficiency after closed breaks of both bones of shin in war are similar. Is somewhat more the period of reduction after the isolated/insulated break of fibular bone. This, apparently it is explained by the fact that the patients with this break were evacuated sometimes not according to the designation/purpose.

On the removal/taking of immobilization to the reduction of

fighting efficiency after the closed breaks of the bones of shin in war it passed from one to one-and-a-half months (table 263). This period was used for the treatment by different physical therapy methods, therapeutic gymnastics and massage for the purpose of the reduction of the function of extremity.

A good anatomical outcome of the treatment of the diaphysic closed fractures of the bones of shin was obtained into 72.0o/o, and together with the ankle - into 76.0o/o. Strain is noted into 12.0o/o, the shortening of extremity - into 9.0o/o and the delayed consolidation - into 3.0o/o.

Table 264. Duration of disablement with the closed breaks of the bones of shin in peacetise, accrding to the data of different installations.

Учреждение (1)	Автор (2)	Средняя длительность нетрудоспособности (3)
(4) Институт имени Н. В. Склифосовского	(5) В. В. Гориневская	(6) 3—4 месяца
(7) Уральский институт травматологии и ортопедии	(8) В. Д. Чаклин	(9) 3 месяца 8 дней
(10) Ленинградский травматологический институт	(11) А. И. Ильин и Г. Я. Эпштейн	(12) 4 месяца и 3 недели
(13) Больница имени В. В. Куйбышева в Ленинграде	(14) И. М. Айзман	(15) От 80 до 145 дней, в зависимости от вида перелома

Key: (1). Installation. (2). Author. (3). Average duration of disablement. (4). Institute im. N. V. Sklifosovskiy. (5). V. V. Gorinevskaya. (6) month. (7). Ural institute of traumatology and orthopedics. (8). V. D. Chaklin. (9) 3 months of 8 days. (10). Leningrad traumatological institute. (11). A. I. Il'in and G. Ya. Epstein. (12) 4 months even 3 weeks. (13). Hospital of name V. V. of Kuybyshev in Leningrad. (14). I. M. Ayzman. (15). From 80 to 145 days, depending on form/species of break.

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All poor anatomical outcomes (24.00/o) were observed with breaks of both bones of shin. Of 12.00/c of strains of extremity they were

observed: recurvation of shin - into 5.0o/o, valgoid of shin and foot - into 4.0o/o and varus of shin - into 3.0o/o. These strains were the result of the insufficient reposition of fragments; sooner or later they lead to the violation of the function of extremity and to the disablement. In 3.0o/o in the final outcome of the treatment of the closed breaks of diaphysis of both bones of shin is noted the delayed consolidation. During further conservative treatment of these breaks, as is shown clinical experiment/experience, in the majority attacks/advances the intergrowth without the outcome into pseudoarthrosis.

The shortening of extremity after the treatment of closed breaks of both bones of shin is noted into 9.0o/o: to 3 cm - into 8.0o/o it is more than 3 cm - into 1.0o/o. The shortening of extremity on 2-3 cm is easily corrected by an increase in altitude of the heel of high boot on the shortened extremity. To correct this shortening it was necessary in each case, otherwise subsequently could develop static scoliosis and lameness.

A good functional outcome of the treatment of the diaphysic fractures of the bones of shin was obtained more than in half of all breaks (59.0o/o), while a good anatomical result was noted into 3/4 all breaks.

Thus, results proved to be completely not identical mainly due to the violation of the function of extremity as a result of the contracture of talocrural joint. This is especially clearly evident on the isolated/insulated breaks of the tibia, with which there was neither strains nor shortenings of extremity, but there was only a contracture in the talocrural joint into 25.00/o. Together with the strain of the shin, noted into 12.00/o of breaks of both bones, was observed to a certain degree difficulty of movement in the talocrural joint. With break of both the ankles/malleoli from every 5 cases into four was noted difficulty of movement in the talocrural joint.

In the war years the direct results of the treatment of the closed breaks of the bones of shin were estimated as good, satisfactory and unsatisfactory.

As the good results were considered such, with which there was not anatomical violations, was maintained the function of large joints and were absent subjective complaints. To satisfactory ones are related the outcomes when there was an insignificant limitation of the function of talocrural joint or a shortening of extremity within the limits of 1-2 cm; to the unsatisfactory ones - all cases with the delayed consolidation, with the sharply pronounced violation of the function of large joints, with the shortening of extremity it is more than on 3 cm and with the strain.

A good result of treatment was observed into 59.00/o, satisfactory - into 17.00/o, unsatisfactory - into 24.00/o of cases.

The reason for the unsatisfactory results of the treatment of the closed breaks of the bones of shin they were: the contracture of talocrural joint into 9.00/o, the contracture of knee joint into 1.50/o, the strain of shin with the contracture of talocrural joint into 6.50/o, the delayed consolidation into 3.00/o, the damage of peripheral nerves into 1.50/o, the combined damages and the associated diseases into 2.50/o. On the localization most frequently the unsatisfactory result was observed in lower third of shin among comminuted fractures of both bones of shin. The contracture of large joints was in half of the cases the reason for unsatisfactory results.

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The analysis of the reasons for these contractures shows that in spite of the most energetic action of physical therapy substances and therapeutic exercise, conducted in the therapeutic installations, especially from second half of 1942, in these cases it was not obtained proper effect mainly because the preventive measures in the

relation to contracture undertaken were in this case with the retardation.

Strain and delayed consolidation of the bones of shin after the closed breaks are the result of the underestimation of the reposition of fragments. The frequent shift/relief of gypsum bandages, noted in some of these cases, was one of the reasons for the delayed consolidation of break.

A significant number of unsatisfactory results of the treatment of the isolated/insulated break of the tibia is explained by the developing resistive contracture in the talocrural joint. The unsatisfactory results of the treatment of the isolated/insulated break of the fibular bone, obtained in 2 cases, relate to the damage of fibular nerve. In 2 cases of the breaks of the ankles/malleoli was obtained unsatisfactory result as a result of developing difficulty of movement in the talocrural joint with the valgoid setting of foot.

The overwhelming number of patients with the closed break of the bones of shin began treatment on DFF (70.00/o), and remaining (30.00/o) - in the army therapeutic installations; however, it finished treatment in the army installations only 11.00/o, in the front line ones - 16.00/o and in the rear evacuation hospitals - 73.00/o.

In connection with this the majority of patients it passed: one stage - 3.00/o, two stages - 12.00/o, three stages - 19.50/o, four stages - 49.00/o, five stages - 12.50/o and six stages - 4.00/o of patients.

Distant results of the treatment of the diaphysic fractures of the bones of shin in peacetime, according to the data of traumatological installations, on the average (according to the data of the works of I. M. Ayzman, V. V. Gorinevskoy and D. K. Yazykov) following: good and satisfactory outcomes - 840/o, unsatisfactory outcomes - 160/o. Thus, the direct results of the treatment of the closed breaks of the bones of shin during the war differ little from the distant results of the treatment of the analogous breaks in peacetime. The inspection/check of the distant results of the treatment of the closed breaks of the bones of the shin of the time of war introduced few important amendments into given data. To the sent out in 1948 form demands to persons, discharged from the army after the closed breaks of the bones of shin, to third of demands was obtained the communication/report about the full/total/complete ability to work.

All these facts attest to the fact that surgeons' tactics in the

treatment of the closed breaks of the bones of shin within entire period of the Great Patriotic War was correct, the diagnosis of these breaks - timely, and treatment - satisfactory. However, the results of treatment could be still better, if more thoroughly it was conducted the timely and sufficient reposition of fragments, and also the preventive measures, directed against the development of the contractures of large joints, which in detail was discussed above. From this point of view, for the closed breaks of the bones of shin most critical stages were the specialized for the treatment of the breaks of extremities KhPPG or army evacuation hospitals, equipped by the appropriate equipment. In these therapeutic installations completely was removed the displacement of the fragments of break, controlled/inspected by the X-ray photograph, and extremity consisted into the gypsum bandage.

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In the same therapeutic installations early they began the systematic, persistent conducting of the therapeutic exercise in the "pulsing" to the active movements, the therapeutic walking and so forth, etc. For the purpose the reductions of ability to work further treatment of closed breaks of both bones of shin, isolated/insulated break of tibial, and also break of both the ankles, malleoli conducted in the specialized rear evacuation hospitals where there was a

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mechano-therapeutic equipment, physical therapy office and experienced methodologists on the therapeutic exercise.

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